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DELORD (A.). **Report on the Operations for the Control of *Phytalus smithi*, Arrow during the Season 1933–34.**—8 pp. Mauritius, 1934. [Recd. May 1935.]

Data are given on the extent of infestation by *Lachnosterna* (*Phytalus*) *smithi*, Arrow, and the number of beetles destroyed on the various sugar-cane plantations in Mauritius during 1933–34 as compared with 1932–33 [*cf. R.A.E.*, A **22** 353]. The two chief Scoliid parasites, *Tiphia parallela*, Smith, and *Campsomeris* (*Elis*) *thoracica*, F., were again recorded in appreciable numbers in certain areas. *C.* (*E.*) *pilosella*, Sauss., was recorded on several plantations, and arrangements were made to obtain further consignments from Madagascar.

BOX (H. E.). **The Biological Control of the Sugar-cane Moth Borer in the Leeward Islands. With an Appendix by J. G. Myers.**—*Trop. Agriculture* **12** no. 4 pp. 89–96, 2 refs. Trinidad, April 1935.

The author gives a brief outline of work on the introduction and liberation of *Lixophaga diatraeae*, Towns., against *Diatraea saccharalis*, F., on sugar-cane in Antigua and St. Kitts in 1932 [*R.A.E.*, A **21** 661] and a more detailed account of its progress in 1933 and 1934 and its general effect on infestation of the 1934 crops. Surveys in St. Kitts showed a progressive increase in its abundance, activity and natural distribution, which now extends practically throughout the Island. Surveys in Antigua revealed a less satisfactory position, though they showed a marked improvement in 1934 compared with 1933; the success of the early colonies was not apparently followed by a continuous increase in abundance or rate of parasitism or by such a wide natural distribution as occurred in St. Kitts. The difference is attributed to the fact that in St. Kitts the cane is grown in a practically continuous belt and that few estates received more than two consignments of 20 fertilised females, whereas in Antigua the cane areas, in which large liberations were made, are grouped into several relatively isolated districts separated by low ranges of hills or stretches of waste vegetation, which tend to limit the spread of the fly. Evidence has been obtained, however, of its ability to continue to breed under field conditions. It is considered, therefore, that although it may be several years before the average parasitism reaches that in St. Kitts, there is no reason to suspect the failure of *Lixophaga* while the infestation of the fields by *Diatraea* remains at a consistently low level.

In both Islands the infestation of sugar-cane was very greatly reduced as compared with that occurring during 1931–33. The reduction in actual losses was even greater, since the damage decreases almost geometrically with arithmetical decreases in joint infestation. The yields were increased and the quality of the juice was unusually good. The evidence indicates that the reduction in infestation is a direct result of the introduction of *Lixophaga*.

Although this Tachinid has become established in some localities in St. Lucia [*cf.* **22** 104], it appears that *Metagonistylum minense*, Towns. (Amazon fly) might be more suitable for the districts of high rainfall. Consignments of *Lixophaga* were sent from St. Kitts to Nevis during June–July 1934 and fertile females were liberated in two of the larger cane-growing areas.

Similar conclusions are reached by J. G. Myers as the result of surveys carried out in Antigua and St. Kitts during November-December 1934. He considers, however, that the results obtained in

(1037) Wt. P12/3603 1700 7/35 S E.R. Ltd. Gp. 353. [A]

Antigua need further analysis since the figure for the average parasitism throughout the Island as a whole gives an inadequate impression of the activities of the parasite. This is due to the fact that within circumscribed areas the populations first of the host and finally of the parasite itself are reduced to too low a level to yield an adequate sample. In St. Kitts, *Lixophaga* was found parasitising *Diatraea* in wild grasses, particularly *Sorghum*.

HOGGAN (I. A.). **Transmissibility by Aphids of the Tobacco Mosaic Virus from different Hosts.**—*J. agric. Res.* **49** no. 12 pp. 1135–1142, 12 refs. Washington, D.C., 15th December 1934. [Recd. April 1935.]

Heavy infections with ordinary tobacco mosaic in tobacco fields are no longer believed to be attributable to dissemination of the virus by Aphids, but investigations were undertaken to determine whether the common occurrence of a limited amount of sporadic infection in such fields under conditions precluding infection from the usual sources might not be due to transmission of the tobacco mosaic virus by Aphids from other food-plants [*cf. R.A.E.*, A **18** 417; **19** 272].

Experiments were carried out in greenhouses in Wisconsin during 1930–34, using *Macrosiphum* (*Myzus*) *solani*, Kalt. (*pseudosolani*, Theo.), *Myzus persicae*, Sulz., and *Macrosiphum solanifolii*, Ashm. In tests in which large numbers of the Aphids were transferred to tobacco from different infected plants, particularly certain perennial solanaceous weeds in which the virus is known to overwinter and various non-solanaceous plants that have recently been shown to be susceptible to the virus, transmission was only obtained regularly from tomato (*Lycopersicum esculentum*) and currant tomato (*L. pimpinellifolium*). The virus was transmitted from them by each species of Aphid. It was occasionally transmitted from 8 of the other species of plants, but from the remaining 8 no transmission took place. In comparative trials with the virus of cucumber mosaic, high percentages of infection of tobacco were obtained with all three Aphids from all but one of the plants tested. It was found that infection with tobacco mosaic was produced by about 1 Aphid in 129 of *Macrosiphum solani*, 1 in 140 of *M. gei* and 1 in 800 or more of *Myzus persicae*. Comparative tests with *M. persicae* showed that 1 Aphid out of 4–5 transmitted a crucifer mosaic to tobacco and 1 out of 4 a sugar-beet mosaic. Thus it seems unlikely that any appreciable dissemination of tobacco mosaic is carried out by Aphids, except perhaps from tomato, and it is doubtful whether much of the sporadic infection in tobacco can be accounted for in this way.

Insect Pests and their Control.—*Agric. Gaz. N.S.W.* **46** pt. 3 pp. 158–161, 6 figs. Sydney, 1st March 1935.

Insects dealt with in these notes, which belong to a series on pests in New South Wales [*cf. R.A.E.*, A **23** 268], include *Plutella maculipennis*, Curt., a pest of cauliflowers and cabbages, against which weekly dustings with 1 part finely ground derris root and 9 parts talc gave satisfactory control. On well grown plants with centre leaves beginning to fold in, derris dust gave better results than a 50 per cent. lead arsenate dust, but treatment should be begun while the plants are still in the seed-bed and continued after transplanting.

BROWNE (F. G.). **Biological Notes on some Malayan Ambrosia Beetles.** —*Malay. Forester* **4** nos. 1–2 pp. 18–22, 90–94, 8 refs. Kuala Lumpur, January & April 1935.

A general outline is given of the bionomics of ambrosia beetles (Scolytids and Platypids) in forests in Malaya, together with brief notes on the distribution and food-plants of many species.

DE PEYERIMHOFF (P.). **Immunité relative, vis-à-vis des insectes parasites, de la forêt méditerranéenne.**—*C. R. Un. int. Inst. Rech. for. Nancy 1932* pp. 553–569. Nancy, 1933. (With Summaries in English and German.) [Recd. April 1935.]

The author points out that forests in European countries with cold continental climates are more sensitive to attack by insect pests, which may kill whole stands of trees. In Mediterranean countries, where the climate is mild, forests are practically immune. Only weakened trees are attacked, and they are rarely killed.

BARBEY (A.). **La forêt française envisagée dans son ensemble au point de vue de la résistance aux attaques des insectes.** [*In French, German and English.*]—*C. R. Un. int. Inst. Rech. for. Nancy 1932* pp. 721–727. Nancy, 1933. [Recd. April 1935.]

Three-quarters of the forests of France are composed of broad-leaved trees, and one-quarter of conifers, which are less resistant to insect attack. Broad-leaved trees can renew their leaves very quickly after defoliation, whereas conifers (other than larch) take several years to do so. For this reason defoliation in spring or summer is more serious than in autumn. *Pinus maritima*, which forms woods in Provence and Gascony, is, however, immune from insect attack. The planting of conifers and broad-leaved trees in association will to some extent protect the former.

BERAN (F.). **Pflanzenschutzmittel. (Verzeichnis 1935.)** [Materials for Plant Protection. List for 1935.]—*Neuheiten PflSch.* **28** no. 2 pp. 37–46. Vienna, April 1935.

This list of commercial insecticides and other preparations for plant protection recognised by the Austrian authorities gives the use for which each is intended, the dilution or mixture required, and the maker's name and address.

KRASUCKI (A.). **Studja nad niezmiarka**—*Chlorops pumilionis* **Bjerk.** —*Pamiętnik* **14** pp. 1–86, 4 pls., 1933. (Abstr. in *Neuheiten PflSch.* **28** no. 2 p. 52. Vienna, April 1935.)

Observations over several years in Poland show that fallow fields and grazing and waste lands are the chief winter quarters and that *Agropyrum* (*Triticum*) *repens* is the chief food-plant of the winter generation of *Chlorops taeniopus*, Mg. (*pumilionis*, Bjerk.). Damage to early sown winter wheat or winter rye by the winter generation is soon made good in spring. Injury in winter is negligible compared with that in summer. There should be as much grazing as possible on pastures in autumn and in spring before May. In years when the flies are exceptionally numerous summer wheat should not be grown.

Schedl (K. E.). **Fortschritte und Forschungen auf forstentomologischem Gebiet.** [Advances and Investigations in Forest Entomology.]—*Anz. Schädlingsk.* **11** no. 4 pp. 37–43. Berlin, April 1935.

This paper belongs to a series of surveys of the more important and recent publications on forest entomology. The subjects discussed include the digestion of wood by insects and the rôle of micro-organisms in this process, the control of Lamellicorn larvae with naphthalene in Mecklenburg, primary and secondary forest pests in Sweden, the occurrence of *Monochamus sutor*, L., on pine and spruce in burnt areas in northern Sweden in 1933, the pine Noctuid [*Panolis flammea*, Schiff.] in Czechoslovakia, the biology of *Hylastes cunicularius*, Er., on spruce in Sweden, the action of pyrethrins, and notes on the study of the ground fauna in forests.

Eidmann (H.). **Der Speckkäfer (*Dermestes lardarius* L.) als Holzzerstörer.** [The Lard Beetle, *D. lardarius*, as a Destroyer of Wood.]—*Anz. Schädlingsk.* **11** no. 4 pp. 43–44, 2 figs. Berlin, April 1935.

In a building in the Rhineland in which food-stuffs were kept, larvae of *Dermestes lardarius*, L., were found to have bored superficially into spruce shelving. Both pupae and newly emerged adults were present in the boards, which had apparently been attacked for lack of other shelter for pupation.

Schwerdtfeger (F.). **Kleine Beiträge zur Kenntnis der Forleule (*Panolis flammea* Schiff.).** [Brief Contributions to the Knowledge of the Pine Noctuid, *P. flammea*.]—*Forstwiss. Zbl.* **57** no. 8 pp. 247–258, 5 figs. Berlin, 15th April 1935.

The author's observations on *Panolis flammea*, Schiff., on pine in Germany have shown that the average number of eggs in one deposition is $4{\cdot}73 \pm 2{\cdot}15$. Nearly half the groups contained 3–4 eggs. There is no important regional variation in these numbers, nor are they influenced by variations in population density. There is a direct linear relation between the size of the tree crown and the number of eggs on it. In the third and subsequent instars, the larvae feed on old pine needles, but in the first instar, and, with a few exceptions, in the second, they eat the needles of the May shoots. The daily number of lumps of excreta, which is constant in all the larval instars, increases with a rise in air-temperature to a maximum at 20–21°C. [68–69·8°F.] and then decreases again. The size also increases up to 21°C. and probably decreases after that. It is estimated that in a given area the number of moths that emerge is constantly in excess of the number of pupae counted, so that if 60 pupae are counted about 100 moths may be expected to emerge. In making counts of the eggs, it was found that 21·3 per cent. were overlooked.

Zumpt (F.). **Revision der europäischen *Calandra*-Arten. Curculioniden-Studien XII.**—*Ent. Bl.* **31** no. 2 pp. 55–59. Krefeld, April 1935.

In this revision of the European species of *Calandra*, which comprise *C. granaria*, L., *C. linearis*, Hbst., and *C. oryzae*, L., the author considers *C. zea-mais*, Motsch., to be a synonym of *C. oryzae*. Examination

of a large number of specimens showed that the characters of size, pronotum and elytra by which the two species have been differentiated are very varied, and there are no differences in the genitalia.

SCHWERDTFEGER (F.). **Studien über den Massenwechsel einiger Forstschädlinge. I. Das Klima der Schadgebiete von** *Bupalus piniarius* **L.,** *Panolis flammea* **Schiff. und** *Dendrolimus pini* **L. in Deutschland.** [Studies on the Variation in Abundance of some Forest Pests. I. The Climate of Regions in Germany where *B. piniarius*, *P. flammea* and *D. pini* are injurious.]—*Z. Forst- u. Jagdw.* **67** pp. 15–38, 85–104, 25 figs., 53 refs. Berlin, 1935.

Details are given of the results of an investigation on the general climate in the parts of Germany in which *Bupalus piniarius*, L., *Panolis flammea*, Schiff., and *Dendrolimus pini*, L., are injurious, with a series of graphs showing records of temperatures, rainfall and air humidities. A list is included of the more important outbreaks of *D. pini* in Germany from 1600 to 1933.

The following is taken from the summary: *P. flammea* tends to recurrent outbreaks in the same locality to a greater degree than *B. piniarius* or *D. pini*. In most cases a region is definitely associated with one species, and there are few places where outbreaks of two or three are possible. The outbreaks occur almost exclusively in the region in which pine occurs naturally, but within this region wide areas remain free from injury.

During the ecologically important period from May to September, the average air temperature in the districts where injury occurs is higher than in the whole pine region [*cf. R.A.E.*, A **23** 227, 296]. All areas of injury are in those parts of the pine region where the rainfall is lowest. The monthly averages of relative humidity vary so little throughout the pine region that no distinctive difference in humidity characterises the areas of injury. In general the climates of areas of injury of all three moths resemble each other, but the monthly average temperatures in the areas in which *D. pini* is very injurious are noticeably higher than those in areas heavily infested by *B. piniarius* or *P. flammea*. The averages from April to August of areas of infestation by *B. piniarius* and *P. flammea* are about the same. The lower limit of rainfall in the areas of greatest injury is about the same for all three species. The upper limit is highest for *B. piniarius* and lowest for *D. pini*. The climatic limitation of the area of greatest injury of *D. pini* was noticeably narrower than that for *P. flammea* and *B. piniarius*.

ÖRÖSI-PÁL (Z.). **Die Altersimmunität der Honigbiene gegen die Milbe** *Acarapis woodi*. [Age-immunity of the Honeybee from the Mite, *A. woodi*.]—*Z. Parasitenk.* **7** no. 4 pp. 401–407, 1 fig., 13 refs. Berlin, 21st March 1935.

The preliminary experiments here described indicate a mechanical reason for the fact that *Acarapis woodi*, Rennie, does not penetrate the tracheae of bees more than 9 days old. The ring of hairs round the stigma in old bees appears to be an obstacle to penetration by the mites. It was also found that the tongue-like chitinous appendage of the protergum that curves over the first stigma of the thorax is sometimes in a depressed position, thus narrowing the entrance to the stigma. Its

position depends on that of the wings, which in turn is connected with the age of the bee.

Listo (J.). **Ruiskutuskokeita hedelmäpuupunkin** (*Paratetranychus pilosus* **C. & F.**) **torjumiseksi.** [Spraying Experiments for the Control of the Fruit-tree Red Mite (*P. pilosus*).]—*Valt. Maatalousk. Julk.* no. 70, 62 pp., 2 figs., 31 refs. Helsinki, 1935. (With a Summary in English.)

Listo (J.). **Hedelemäpuupunkin torjunta.** [The Control of the Fruit-tree Red Mite].—*Valt. Maatalousk. Tiedon.* no. 93, 7 pp., 2 figs. Helsinki, 1935.

A detailed account is given of experiments in 1933–34 with sprays for the control of *Paratetranychus pilosus*, C. & F., which has of recent years become a serious pest of fruit trees in Finland. The most effective of those tested in the laboratory against the winter eggs on apple and plum twigs were mineral oil emulsions, which killed 95·4–99·8 per cent., a commercial combination of mineral oil and tar distillate coming next. Ordinary tar distillates were generally much less efficient. The latter, however, as well as the combined spray, gave very satisfactory results against the eggs of the apple sucker, *Psylla mali*, Schm. None of the sprays damaged the twigs badly if applied before the buds had begun to open.

In orchard experiments, in which young apple and plum trees were sprayed in April, oil emulsions (especially those made of lubricating oil at a concentration of 10 per cent.) killed a very high percentage of the eggs of the mite. Of four combined sprays of oil and tar distillate, three, used in a 10 per cent. concentration, gave good results. As in the laboratory, tar distillates alone had comparatively little effect. The mite could not be completely eradicated by any of the sprays, but if they are very thoroughly applied, its numbers are so reduced that it causes no damage in the early summer. Another test showed that winter sprays are more effective the later they are applied, though treatment must be finished before the buds begin to open.

For summer treatment on apples, a commercial lime-sulphur (23° Bé.), used at a dilution of 1 : 35 or 1 : 26, was very effective against the mites, the stronger spray, with the addition of gelatine (½ lb. per 100 gals.) sometimes giving complete mortality. The eggs were not affected, but if enough lime-sulphur remained on the leaves, the young mites were killed when they hatched. The best results were obtained by applying one spray at the end of May or beginning of June (before flowering) and one or two more in early August to prevent the deposition of winter eggs. The results of comparative tests of other sprays were not conclusive, though certain oil emulsions gave fairly good results without injuring the trees.

Kéler (S.). **A Contribution towards the Knowledge of the Frit Fly** (*Oscinella frit* **L.**). [*In Polish.*]—*Prace Wydz. Chor. Rośl. państw. Inst. nauk. Gosp. wiejsk. Bydgoszczy* no. 14 pp. 79–86, 1 fldg. graph, 4 refs. Bydgoszcz, 1935. (With a Summary in English.)

Oats, which are only sown in spring in Poland, suffer more than winter cereals from the attacks of *Oscinella frit*, L. [*cf. R.A.E.*, A **19** 592]. Observations on the periods of maximum prevalence of the adults, by daily collection in the field from 7th May till 8th October, were made in north-western Poland in the hope of finding dates for sowing that would

safeguard the crop from infestation. The three flight periods reached their peaks in May–June, July and the second half of August [*cf.* **19** 591], and the flies were most abundant during the last three weeks of July. The adults from overwintered larvae occurred on winter rye and wheat from 12th May to mid-June, and also on oats from mid-June until early July. Those of the first generation were present from the end of June throughout July. There was then a sharp decrease in the abundance of the flies until those of the second generation appeared in the second half of August. From 2nd July to 18th September the flies occurred only on oats, after which they migrated to self-sown wheat as the oats were mown. The females were more numerous than the males. Many of them, however, were rendered sterile by the Nematode, *Tylenchinema oscinellae*, Goodey [**20** 457], which also attacked the males.

It is concluded that in Poland oats cannot be protected by early sowing, as they would have to be sown early enough to have all secondary haulms well developed and tillering completed by mid-May, which is practically impossible. The best safeguard is to cultivate quick-growing varietes [*cf.* **14** 20].

KÉLER (S.). **Some Remarks on the appropriate Control of the Grain-weevil.** [*In Polish.*]—*Prace Wydz. Chor. Rośl. państw. Inst. nauk. Gosp. wiejsk. Bydgoszczy* no. 14 pp. 87–93. Bydgoszcz, 1935. (With a Summary in English.)

As *Calandra granaria*, L., is a serious pest of stored cereals in Poland, investigations were carried out on the possibility of destroying it in the mills when the infested grain is passed through certain machines. Observations have shown that the weevils are affected by any movement in the grain, trying to escape if it is slight, or feigning death if it is more rapid. In the mills, the grain is first passed with force through a cleaning machine, and the weevils are carried with the chaff, débris and small grains through two or more sieves into the funnel that conducts all waste into a bag at the bottom. Once in the bag, where the motion produced in the grain by the flow of waste is slight, the weevils become active and make their way to the opening to escape. As the bags are filled with waste, they are removed to storehouses, where the weevils readily migrate to bags of grain for sale, in which they are distributed over the country. This can easily be avoided, however, if the débris is conducted direct from the sieves to a special steel drum where it is roughly ground with grinding stones. This method of destroying the weevils has proved very satisfactory in a few mills in which it has been adopted.

Another method consists in catching the weevils escaping from the bags by means of a simple contrivance, experiments with which will be published later.

KÉLER (S.). **A Contribution towards the Knowledge of the Apple Skeletonizer** (*Simaethis pariana* **Clerck**). [*In Polish.*]—*Prace Wydz. Chor. Rośl. państw. Inst. nauk. Gosp. wiejsk. Bydgoszczy* no. 14 pp. 95–97. Bydgoszcz, 1935. (With a Summary in English.)

In the autumn of 1926 the author reared four Ichneumonids from *Hemerophila* (*Simaethis*) *pariana*, Clerck, in Poland, *viz.*, *Angitia*

armillata, Grav., which was the most numerous, *Mesochorus vittator*, Zett. (which was probably a parasite of *Angitia*), *Hybophanes scabriculus*, Grav., and *Pimpla* sp. From a comparison of his material with that obtained from *H. pariana* by Minkiewicz [*R.A.E.*, A **14** 196], he concludes that the Ichneumonids recorded by the latter as *M. testaceus*, Grav., and *Eulimneria fuscicarpus*, Thoms., were in reality *M. vittator* and *A. armillata* respectively. The morphological characters of these parasites are briefly discussed.

KÉLER (S.). **Preliminary Account of the Results of a Study on the entomological Bibliography of Great Poland and Pomerania.** [*In Polish.*]—*Prace Wydz. Chor. Rośl. państw. Inst. nauk. Gosp. wiejsk. Bydgoszczy* no. 14 pp. 99–106, 1 fldg chart. Bydgoszcz, 1935.

A brief outline is given of the entomological literature that has appeared since about 1740 in Pomerania and East Prussia, and since about 1800 in Great Poland. In Pomerania and East Prussia more of the journals involved deal with natural history in general, whereas in Great Poland more are devoted to agricultural subjects. This is probably because Great Poland is a plain suitable for agriculture, whereas in Pomerania and East Prussia the conditions vary greatly and large parts of the land are covered with forests. The serial publications are listed (in groups indicating their scope) in a table that shows the periods during which they were issued. In another table are given the numbers of papers on the various orders of insects published during the last 180 years ; they amount to a total of 1,658.

SEYRIG (A.). **Relations entre le sexe de certains Ichneumonides (Hym.) et l'hôte aux dépens duquel ils ont vécu.**—*Bull. Soc. ent. Fr.* **40** no. 5 pp. 67–70. Paris, 1935.

Females of the genus *Pimpla* and allied genera are usually a good deal larger than the males. The author's observations made in Madagascar in 1934 on *Echthromorpha hyalina*, Sauss., and *Pimpla maculiscaposa*, Srg., reared from large and small pupae of various Lepidoptera collected in the field, confirmed Shevuirev's statement that large host pupae give rise to females and small ones to males [*R.A.E.*, A **2** 6, 214]. But he adduces evidence against Shevuirev's theory that the females regulate the sex of their progeny according to the size of the host pupae, and proposes instead the hypothesis that the majority of the eggs are unfertilised. The ground for this hypothesis is that males are much more common than females and that eggs laid by virgin females produce only males. It seems likely that some females lay at least a part of their eggs before they have paired. The author thinks that the males are attracted by the odour of the females and that large females resulting from the better nourished larvae (which would occur in large host pupae) may possibly have a stronger odour than the small ones. In the author's collections there was more secretion on the large than on the small females. If this suggestion is correct, unfertilised females would occur more frequently among small individuals than among the large ones. Further, since insects that have lived on a certain host tend to return to it for oviposition, large females, capable of laying female eggs, would place them in large pupae, whereas small ones, which are often able to produce only male descendants, would lay their eggs in pupae of small species.

Pussard (R.). **Sur l'existence de quelques nouveaux foyers des pucerons du fraisier,** *Aphis forbesi* **Weed et** *Capitophorus fragaefolii* **Ckll. (Hem.).**—*Bull. Soc. ent. Fr.* **40** no. 5 pp. 70–72, 4 refs. Paris, 1935.

Cerosipha (*Aphis*) *forbesi*, Weed [*cf. R.A.E.*, A **19** 585] was observed by the author on strawberries in August 1932 in the Department of Seine-et-Marne, in April 1934 in the Department of Var, and in May 1934 at Antibes, which indicates that it is now widely distributed in France. In Seine-et-Marne the Aphids were heavily parasitised by *Aphidius*, and at Saint Genis-Laval (near Lyons) many were infested by Trombidiid mites, especially *Allothrombium fuliginosum*, Herm. The activity of the Braconid seemed to be in inverse proportion to that of the ants attending the Aphid, but the mite was apparently not affected by this. In Var, the ant associated with *C. forbesi* was *Pheidole pallidula*, Nyl. With one exception, only aerial colonies of the Aphid were found in France.

Capitophorus potentillae, Wlk. (*fragaefolii*, Ckll.) [*cf.* **22** 51] was observed in the same places in France as *C. forbesi*, but it causes considerably less damage.

Plagas del campo. Memoria del servicio fitopatológico agrícola. Año 1933. [Pests and Diseases of Agriculture. Memoir of the Phytopathological Service, Year 1933.]—Roy 8vo, 312 pp., illus. Madrid, Minist. Agric., 1934. [Recd. May 1935.]

This annual report includes an account of the organisation of the phytopathological service in Spain, short notes on the plant pests and diseases observed in 1933 (a section being devoted to locusts), and reports on plant inspection and experimental work in various parts of Spain.

Pussard (R.). **Nouvelles observations sur le** *Capnodis tenebrionis* **L. (Col. Buprestidae).**—*Bull. Soc. ent. Fr.* **40** no. 4 pp. 54–59, 9 refs. Paris, 1935.

Further observations in France on the biology of *Capnodis tenebrionis*, L. [*R.A.E.*, A **23** 230, etc.] are recorded. The sight of a single male feeding in several places on the bark of a young pear shoot confirmed the observations of others that pear trees are occasionally attacked in addition to stone fruits, though the author himself has not observed larvae in them.

In an experiment in which a male was placed in a cage with peach branches, the amount of feeding increased with temperature. Feeding continues from the emergence of the adult until the end of the oviposition period and even longer while the weather remains favourable. The sexes are about equal in numbers, but the males are more numerous on the branches, whereas the females congregate at the base of the trunk, where they oviposit. A newly emerged beetle taken on 26th July 1934 did not oviposit until 11th August, but laid 61 eggs between 13th and 30th August. At temperatures varying between 16 and 25°C. [60·8–77°F.] the eggs take 30 days to hatch, but at a constant temperature of 30°C. [86°F.] the time is only 15 days.

Bertin (C.). **La chimie des ortho-arséniates de plomb.**—28 pp., 9 figs., 65 refs. Algiers, 1934. [Recd. April 1935.]

After briefly reviewing the history of the development of the use of arsenical insecticides and dealing with the method of preparing lead arsenates and their chemical constitution, the author describes varied experiments on the reaction of lead nitrate and lead acetate with arsenic acid and each of the three sodium arsenates. The results of a granulometric method of analysing lead arsenates and an account of some experiments on the increased degree of dispersion of the arsenates effected by using gelatine in their preparation conclude the essay.

Petherbridge (F. R.) & Stirrup (H. H.). **Pests and Diseases of the Sugar-beet.**—*Bull. Minist. Agric.* no. 93, 58 pp., 16 pls., 1 fig. London, 1935. Price 1*s.* 6*d.*

As a result of information obtained on a tour of the principal beet-growing areas of Europe, Petheridge briefly reviews the bionomics and control of insects and other animals attacking beet. Stirrup deals in a similar way with the diseases of beet, including virus diseases transmitted by Aphids and other insects.

Richards (O. W.). **Some Breeding Records of Hymenoptera.**—*J. Soc. Brit. Ent.* **1** pt. 3 pp. 81–86. Southampton, 22nd April 1935.

Among parasites recorded in England in 1933 were *Ichneumon* (*Barichneumon*) *heracleanae*, Bridgm., *Pimpla similis*, Bridgm., *Psychophagus omnivorus*, Wlk., and *Dibrachys cavus*, Wlk., from *Depressaria heracleana*, L.; *Trichomalus irus*, Wlk., from *Apion loti*, Kby.; *Pseudotorymus apionis*, Mayr, from *Apion apricans*, Hbst.; and *Rhaphitelus maculatus*, Wlk., *Cheiropachys colon*, L., and *Eurytoma ischioxanthus*, Ratz., from *Scolytus mali*, Bechst.

van der Laan (P. A.). **Over de houdbaarheid van de giftigheid van derrispoeder en rotenon.** [The Keeping Quality of the Toxicity of Derris Powder and Rotenone.]—*Tijdschr. PlZiekt.* **41** no. 4 pp. 77–87, 15 refs. Wageningen, April 1935.

This paper begins with a review of recently published work on the keeping quality of rotenone and derris powder. Light oxidises rotenone to inactive compounds and water accelerates this change. Dihydrorotenone appears to be more resistant to light than rotenone, from which it is derived.

In laboratory and field work in Holland with derris powder and rotenone the chief test insects were Aphids and Lepidopterous larvae. The rotenone was dissolved in acetone, and the solution was diluted with water to total dilutions of from 2,500 to 10,000. The water contained 0·1–0·5 per cent. Agral as a spreader. The derris powder was used as a dust, mixed with a carrier such as French chalk, or as a spray. Rotenone proved much more poisonous than dihydrorotenone. A solution of rotenone lost half its power after exposure for 5 hours to direct sunshine, and it could not be stored. Dry crystals of rotenone lost none of their effectiveness after 42 days exposure to direct sunshine. Derris powder, spread out dry in sunshine, lost about half its activity after 3 days. In the shade the loss was less rapid. Mixed with water the powder retained its power unimpaired after 11 days, but lost some

power after 25. After 2 days a concentrated soap solution of the powder had lost some power. The insecticidal effect of derris was greater than its rotenone content alone would indicate, as it contained other toxic constituents. It left some traces on the plants, and rotenone therefore seems preferable for fine fruits and vegetables. Rotenone only acted as a contact poison, but dusted or sprayed derris powder acted after a few days and is thought to have been a stomach poison as well as a powerful contact poison [*cf. R.A.E.*, A **23** 295, 326]. It is concluded that the effect of light and moisture is unimportant if derris and rotenone are properly used.

VAN POETEREN (N.). **De wet tot bestrijding van den Coloradokever.** [The Law for the Control of the Colorado Potato Beetle.]—*Tijdschr. PlZiekt.* **41** no. 4 pp. 89–100, 1 pl. Wageningen, April 1935.

Following regulations designed to prevent the introduction of *Leptinotarsa decemlineata*, Say, into Holland [*R.A.E.*, A **21** 85], a law passed in December 1934 defined the measures to be taken if it appears in that country. The text of this law and that of a circular (no. 47) issued by the Plant Protection Service and describing the bionomics and control of the beetle are reproduced.

JANCKE (O.). **Zur Kälteempfindlichkeit der Blutlaus.** [The Sensitivity to Cold of the Woolly Aphis.]—*NachrBl. dtsch. PflSch-Dienst* **15** no. 5 pp. 46–47. Berlin, May 1935.

In laboratory tests the woolly apple aphis [*Eriosoma lanigerum*, Hsm.] was found able to resist a temperature of −14°C. [6·8°F.] for 20 hours. At −18°C. [−0·4°F.] 5 per cent. were killed after 2 hours and 83 per cent. after 92 hours. After one hour at −25°C. [−13°F.] 75 per cent. of the Aphids were alive, but after 18 hours all were dead. After 3 hours at −27·5°C. [−17·5°F.] all were dead, and none survived long after one hour's exposure to this temperature. The critical temperature therefore lies between −25°C. and −27·5°C., and a winter night with several hours at this temperature destroys the individuals on the trunks and crowns of apple trees, leaving only those protected by snow or in the ground. Such colonies do not occur on immune stocks.

MARIANI (M.). **Ancora sulla infestione di *Sesamia vuteria* Stoll in provincia di Messina.** [A further Communication on the Infestation by *S. vuteria* in the Province of Messina.]—*Boll. Soc. ent. ital.* **66** no. 8 pp. 184–188, 1 fig. Genoa, October 1934. [Recd. May 1935.]

Continuing previous work [*R.A.E.*, A **23** 11] on the infestation of wheat in Sicily by *Sesamia vuteria*, Stoll, which usually attacks maize, a description is given of all stages of a dwarf form, *S. vuteria* f. *ciccarelli*, n. Only dwarf adults developed from larvae in wheat stems. If a larva found one stem insufficient, it passed to another. The mature larva makes a support for the pupa from the woody material in the stem and cuts a large exit hole for the adult. The pupal period lasted about 15 days. The adults emerged in the afternoon and were on the wing between 9 and 11 p.m. They lived for barely 3 days and did not oviposit if no food-plant was available. This Noctuid is attacked by

two Hymenopterous and one Dipterous parasite, but they are unimportant.

Rocci (U.). **La *Depressaria* dell'anice in Italia.**—*Boll. Soc. ent. ital.* **66** no. 9 pp. 221–230, 5 figs. Genoa, November 1934. [Recd. May 1935.]

In central Italy, anise (*Pimpinella anisum*) has been attacked for some years by a Tineid here described as *Depressaria* (*Schistodepressaria libanotidella*, Schläger, f. *bantiella*, n. Notes on the morphology and distribution of this and other forms are given. The larvae live gregariously on the inflorescences and pupate in cocoons on the plant. The pupal stage lasts about 15 days. The adults are nocturnal.

Colizza (C.). **Contributo alla conoscenza delle coccinigliе del Mozanbico (Hemip. Coccidae).** [A Contribution to the Knowledge of the Coccids of Mozambique.]—*Boll. Soc. ent. Ital.* **66** no. 9 pp. 237–242, 2 figs. Genoa, November 1934. [Recd. May 1935.]

Ferrisiana virgata, Ckll., is recorded on *Trilax* sp. in Mozambique. The larva and female are described and notes are given on its distribution, food-plants and natural enemies in other parts of the world.

Fouts (R.). **Report on a small Collection of Parasitic Hymenoptera from Italian Somaliland.**—*Mem. Soc. ent. ital.* **13** no. 1 pp. 98–109, 5 figs. Genoa, December 1934. [Recd. May 1935.]

The new species described include *Microphanurus carinifrons* from eggs of *Nezara* sp. and from a branch of cotton probably infested with eggs of *Nezara*, and *Telenomus antennalis* and *Synopeas paolii*, both from leaves of *Cassia fistula* infested by *Lecanium* sp.

Mallamaire (A.). **Extraits du Rapport de la Station expérimentale du Palmier à huile de la Mé. Année 1933. Etude systématique et biologique des principaux animaux et insectes parasites des plantes cultivées en Côte d'Ivoire.**—*Bull. Com. A.O.F.* **17** no. 3 pp. 434–485, 5 pls., 3 refs. Paris, 1934. [Recd. May 1935.]

Notes are given on the bionomics and control of a large number of insect pests that occur in the Ivory Coast. They are dealt with under the plants infested and in most cases are briefly described.

One of the more important pests of coffee is *Pseudococcus* sp., colonies of which are commonly clustered at the base of the fruit peduncles and in young buds. Infested branches should be cut off and burnt, and, if necessary, sprays of lime-sulphur or one of several oil emulsions, formulae for which are given, should be applied. The Acridid, *Zonocerus variegatus*, L., is also sometimes very destructive to coffee. The measures advocated are digging up the egg-pods, jarring the adults and hoppers off the trees into nets, spraying with soap-kerosene emulsion against the hoppers, and using poison baits against the adults. The baits are made of leaves, grass, etc., soaked with water containing 12–16 lb. molasses and 3 lb. sodium arsenite (80 per cent. As_2O_3) or 4 lb. sodium fluosilicate per 10–15 gallons. In uncleared areas the adults may be destroyed by spraying the weeds and coffee trees with sodium arsenite (80 per cent.) or sodium fluosilicate at the

rate of 5–6 lb. or 8 lb. respectively in 100 gallons water, with 5 gals. skimmed milk, ½ lb. casein, or 20 lb. tapioca flour paste as a sticker. These sprays act as contact as well as stomach insecticides. The grasshoppers begin to die 24 hours after the spraying. The larvae of *Epicampoptera* (*Metadrepana*) *glauca*, Hmpsn., sometimes entirely defoliated coffee trees 4–5 years old. The egg, larval and pupal stages of this Drepanid last 8–12, 32–43 and 8–10 days, respectively, and it probably has more than 4 generations a year. The larvae are killed by arsenical or contact sprays.

The chief pest of cacao is *Sahlbergella singularis*, Hagl. [*cf. R.A.E.*, A **19** 732]. Eggs, of which a female lays about 50, are usually deposited, singly or in batches of 5–6, in the bark of the shoots. In the Ivory Coast there are apparently two periods of oviposition, the more intense of which coincides with the beginning of the rainiest season. Bredo's observation that cacao plants producing red pods are more resistant than plants with yellow pods [*loc. cit.*] has been confirmed, and the same control measures are recommended. Serious damage to the foliage is caused by the Rutelid, *Adoretus umbrosus*, F. (*hirtellus*, Lep.) [*cf.* **13** 528], the larvae of which can be destroyed by watering the soil round infested trees with 3 per cent. tar distillate, and the adults by spraying with lead arsenate (1 lb. to 50 gals. water).

Coconut pests include Dynastids of the genus *Oryctes* and the Coccid, *Aspidiotus destructor*, Sign.

Kola is sometimes severely attacked by the Lamiid, *Phosphorus jamsoni*, Chevr. Small infested branches should be removed, and petrol should be injected into the galleries in the trunks and limbs. The nuts are infested by the Curculionid, *Balanogastris kolae*, Desbr., which oviposits in them while they are growing or while they are in the baskets after harvesting. Several pupae sometimes occur in the same chamber at the end of the larval gallery. In laboratory experiments, fumigation with chloropicrin killed all the adults and pupae in infested nuts in 24 hours, but many larvae remained active. The treatment did not make the nuts unpalatable. All material that has been used to pack the nuts should be at once destroyed.

The larvae of *Sesamia vuteria*, Stoll, 8–10 and even 15 of which are found in one stem, make it very difficult to cultivate maize in the Ivory Coast. The adults pair soon after emerging, and the females lay their eggs on the leaves and stems. The egg, larval and pupal stages last about 10, 30–40 and 15 days respectively. Pupation usually occurs at the base of the stem. Control consists in burning the stems infested first, destroying the stubble after harvest and cultivating the maize among ground-nuts, as infestation is less severe if the maize plants are not too close together. Stored maize is heavily infested by *Calandra oryzae*, L., a new generation of which appears every 30–40 days. Since the weevil avoids light, the cobs should be suspended in the sun. Maize for export should be fumigated with chloropicrin or carbon bisulphide.

WORTHLEY (L. H.). **The Dutch Elm Disease Eradication Project : Federal, State and Local Cooperation.**—*Circ. U.S. Dep. Agric.* no. 353, 4 pp. Washington, D.C., March 1935.

The distribution of Dutch elm disease (caused by *Ceratostomella ulmi*) and the Scolytids possibly responsible for its spread [*cf. R.A.E.*, A **22** 652] is briefly reviewed with particular reference to the United States

[*cf.* **23** 327]. The usual measures to prevent the spread of the disease are summarised.

BERGER (E. W.). **The Destructor Scale. How to Control it.**—*Pr. Bull. Fla agric. Exp. Sta.* no. 473, 2 pp., 1 fig. Gainesville, Fla, February 1935.

Of recent years, *Aspidiotus destructor*, Sign., has been increasing on the east coast of Florida. A list is given of the plants on which it has been found, of which coconut and avocado are preferred. Before spraying with oil emulsions, which will probably afford the best means of control, the severely infested parts of the trees (particularly palm leaves) should be cut out and placed 2–3 yds. from the base of the trunk. This enables any predacious Coccinellids present to mature and return to the tree, but few, if any, of the scale crawlers will be able to do so.

[**Papers on the Codling Moth Control.**]—*Bienn. Rep. Kans. hort. Soc.* **42.** Topeka, 1934. [Recd. May 1935.]

The usual measures for the control of the codling moth [*Cydia pomonella*, L.] on apples in the United States are discussed in the following papers : Control of the Codling Moth, by D. P. Dell (pp. 23–26) ; Spraying Fruit Trees, by G. W. Cochran (pp. 39–46) ; Pruning as an Aid to Codling-moth Control, by H. L. Lobenstein (pp. 74—77) ; Value of Hootch[bait] Pots and chemically treated Bands in the Control of Codling Moth, by L. W. Patton (pp. 77–81) ; The Value of chemically treated Bands in the Control of Codling Moth, by C. D. Woodbury (pp. 82–83) ; Value of Hootch Pots and chemically treated Bands in the Control of the Codling Moth, by G. T. Groh (pp. 85–87) ; Spraying for the Control of the Codling Moth, by G. A. Dean (pp. 89–92) ; and the Codling Moth and Factors affecting its Control, by R. L. Parker and P. G. Lamerson (pp. 100–107). Other papers are : Control of the Codling Moth by Use of Oil Sprays, by A. J. Ackerman (pp. 17–23) ; Petroleum Summer Oil Sprays, by G. A. Dean (pp. 26–32) ; Arsenical Compound Substitutes for Lead Arsenate in the Control of the Codling Moth, by Lamerson and Parker (pp. 93–98) ; and The Spray Residue Problem in Kansas, by G. A. Filinger (pp. 126–129, 7 refs.).

DEAN (G. A.). **Mites and Spiders. A Summary of the distinguishing Characters and Control Methods of the Clover Mite, Red Spider and European Red Mite.**—*Bienn. Rep. Kans. hort. Soc.* **42** pp. 48–50. Topeka, 1934. [Recd. May 1935.]

The differences in structure and bionomics between *Bryobia praetiosa*, Koch (*pratensis*, Garm.), *Tetranychus telarius*, L., and *Paratetranychus pilosus*, C. & F., are briefly noted, and recommendations for their control in Kansas are given.

DELL (D. P.). **Red Spider and Clover Mite.**—*Bienn. Rep. Kans. hort. Soc.* **42** pp. 50–52. Topeka, 1934. [Recd. May 1935.]

Mites infesting apples in Kansas in 1929 were suspected to be the clover mite [*Bryobia praetiosa*, Koch], but the subsequent scarcity of overwintering eggs indicated that some other species was mainly concerned. In 1930 some individuals were identified as the two-spotted mite [*Tetranychus bimaculatus*, Harv.], which the author considers

distinct from the common red spider [*T. telarius*, L.], a species that is distributed throughout the United States and has similar habits and food-plants. The infested leaves, on which there were often as many as 60 mites, were spotted and webbed on the lower surface. During the winter of 1931–32 the mite was also found on apple in Missouri. In July 1932, it was responsible for the yellowing and dropping of leaves of deciduous shade trees in Kansas City. Experience showed that good control may be obtained by the application of summer oil at 1–1½ per cent. in late June or July before any damage is apparent. This spray should not be necessary, however, where combinations of oil and lead arsenate are applied against the codling moth [*Cydia pomonella*, L.]. *B. praetiosa* is readily controlled by a dormant oil spray since it overwinters in the egg stage on the bark of twigs and limbs.

Lamerson (P. G.). **The Apple Curculio in northeastern Kansas.**—*Bienn. Rep. Kans. hort. Soc.* **42** pp. 53–57. Topeka, 1934. [Recd. May 1935.]

A study of the bionomics of *Tachypterellus quadrigibbus magnus*, List, which damaged 35–100 per cent. of the apples in some orchards in Kansas, was undertaken in 1932. The hibernating weevils, which are found chiefly in heaps of leaves under trees and also in mixtures of leaves and manure, will move from unfavourable to favourable environments. They all came out of hibernation within a few days and reached their greatest abundance on 5th May. Eggs were most numerous on 27th May, larvae on 11th June, pupae on 13th July and adults on 4th August. Emergence continued for at least 2 months. The egg, larval and pupal stages lasted 7–10, 13–28 and 4–7 days, respectively, for 15 individuals. The adults feed on the twigs, green shoots and the ripening fruit. The eggs are laid and the immature stages are passed in the fruit. Enough infested apples remained on the trees to ensure heavy infestation in the following year, even if all the fallen fruit was gathered and destroyed. An average of 16 per cent. of the larvae collected between 20th June and 20th July were attacked by 3 Hymenopterous parasites [*R.A.E.*, A **22** 533]. Parasitism was highest in apples collected in areas free from cover. Burning the rubbish in which they hibernate seems to be the best way to control the weevils.

Hungerford (H. B.). **The Oriental Fruit Moth in Kansas.**—*Bienn. Rep. Kans. hort. Soc.* **42** pp. 57–59. Topeka, 1934. [Recd. May 1935.]

On and after 14th July 1932, *Cydia* (*Grapholitha*) *molesta*, Busck, was found on peaches in 13 of 22 counties surveyed in eastern Kansas. It had not previously been recorded in the State. Notes are given on its bionomics in other areas and on control measures, which include a bait of a 10 per cent. solution of brown sugar, to each U.S. qt. of which 1 cc. terpenyl acetate is added [*cf. R.A.E.*, A **21** 599]. If this bait is emulsified with saponin, it will remain effective for a month.

Dean (G. A.). **Strawberry Insects and their Control.**—*Bienn. Rep. Kans. hort. Soc.* **42** pp. 137–143. Topeka, 1934. **The Control of some Insects infesting Garden Flowers and Ornamental Shrubs.**—*T.c.* pp. 202–210. [Recd. May 1935.]

These papers contain notes on the bionomics, distribution and control of common pests of the crops concerned in Kansas. The

strawberry pests include *Empria fragariae*, Rohw., and *E. maculata*, Nort. [*cf. R.A.E.*, A **5** 142; **15** 590], which attack the leaves in late May or early June, and may be controlled by sprays of 2 lb. lead arsenate in 50 U.S. gals. water plus Bordeaux mixture 3–6–50 or of ½ U.S. pint nicotine sulphate and ½ U.S. gal. summer oil in 50 U.S. gals. water, or by a pyrethrum dust. The Bordeaux mixture makes the lead arsenate adhere better to the leaves. The second paper concludes with tabulated notes on sprays, dusts, poison baits, repellents and greenhouse fumigants.

Mendes (D.). **Nota sobre** *Saissetia discoides* **(Hempel) (Hom. Coccidae.)**—*Rev. Ent.* **5** fasc. 1 p. 88. Rio de Janeiro, April 1935.

Saissetia (*Lecanium*) *discoides*, Hemp., is recorded on guava in the State of Rio de Janeiro. An oil emulsion or lime-sulphur are recommended if control is required.

Wille (J.). **Informe sobre el viaje a las lomas de Lachay, efectuado el 24 de Julio de 1933.** [Report on a Journey to the Lachay Hills on 24th July 1933.]—*Biol. Direcc. Agric. Ganad. Peru* **4** no. 13–16 pp. 179–181, 2 figs. Lima, 1934. [Recd. May 1935.]

In the Lachay hill district of Peru, wild *Citrus* trees were not infested by *Lepidosaphes beckii*, Newm., or *Selenaspidus articulatus*, Morg., which are serious pests of *Citrus* in the coastal valleys. *Saissetia oleae*, Bern., occurred in small numbers on one of the trees. *Dysdercus ruficollis*, L., which had migrated from cotton in the valleys, infested tobacco sown the previous year, but did no harm. A Halticid, probably of the genus *Epitrix*, made holes in the leaves of tobacco and potato.

Porter (C. E.). **Acerca de algunos insectos nocivos.** [Some injurious Insects.]—*Rev. chil. Hist. nat.* **38** pp. 121–123. Santiago, 1934. [Recd. May 1935.]

The following insects are recorded from Chile: *Spermophagus thomasi*, Brèthes, from seeds of *Gourliea chilensis*; *Bruchus ferrugineipennis*, Blanch., from *Cassia*; *Sitodrepa panicea*, L., from dried roots of medicinal plants; *Athlia rustica*, Erichs., from grapevine; *Dexicrates robustus*, Blanch., from branches of olive; *Lophotus phaleratus*, Erichs., from peach and willow; *Tipula* sp. from wheat fields; *Heliothrips haemorrhoidalis*, Bch., from pear; *Asterolecanium variolosum*, Ratz., from oaks; *Prontaspis* (*Chionaspis*) *citri*, Comst., from orange; and *Saissetia oleae*, Bern.

Olivares H. (B.). **Destrucción de áfidos por medios biológicos y posibilidad de internación de entomófagos exóticos para el mismo fin.** [The Destruction of Aphids by biological Means and the Possibility of importing exotic Predators into Chile for the same Purpose.]—*Rev. chil. Hist. nat.* **38** pp. 145–153. Santiago, 1934. [Recd. May 1935.]

A brief general account is given of Aphids and of their natural enemies, including a number of Coccinellids.

PORTER (C. E.). **Lamelicornios chilenos que interesan a la agricultura.** [Chilean Lamellicorns of Interest to Agriculture.]—*Rev. chil. Hist. nat.* **38** pp. 188–197, 5 figs., 13 refs. Santiago, 1934. [Recd. May 1935.]

In addition to those already recorded [*R.A.E.*, A **13** 233], the injurious species mentioned are a Rutelid, *Hylamorpha* (*Sulcipalpus*) *elegans*, Burm., the adults of which attack the leaves of *Notofagus obliqua*, and a Dynastid, *Ochrosidia* (*Ligyrus*) *villosa*, Burm., the adults of which attack the stems and the larvae the roots of sunflowers.

BLANCHARD (E. E.). **Aphid miscellanea. Part II.**—*Physis* **11** no. 40 pp. 366–383, 17 figs. Buenos Aires, February 1935. [Recd. May 1935.]

Descriptions are given of a number of Aphids from Argentina, including *Capitophorus braggi*, Gill., on artichoke (*Cynara scolymus*), *C. potentillae*, Wlk. (*fragariae*, Theo.) on strawberry, *Aphis laburni*, Kalt., on *Sesbania punicea* and lima beans (*Phaseolus lunatus*), and *Myzocallis castanicola*, Baker, on chestnut (*Castania sativa*).

BLANCHARD (E. E.). **Microgastrinos argentinos, nuevos y poco conocidos. Primera parte.** [New or little known Argentine Microgastrinae. Part I.]—*Physis* **11** no. 40 pp. 459–471, 5 figs. Buenos Aires, February 1935. [Recd. May 1935.]

The species described include *Apanteles williamsoni*, sp. n., reared from *Tatochila autodice*, Hb., on cabbages, and *A. oeceticola*, sp. n., from *Oeceticus kirbyi*, Guild.

NOBLE (N. S.). *Epimegastigmus brevivalvus* **Girault, a Parasite of the Citrus Gall Wasp,** *Eurytoma fellis* **Girault.**—*J. Aust. Inst. agric. Sci.* **1** no. 1 p. 29. Sydney, March 1935.

Epimegastigmus brevivalvus, Gir., was found to be the most abundant parasite of *Eurytoma fellis*, Gir., in northern New South Wales [*cf. R.A.E.*, A **22** 251]. It lays its eggs in those of the host, which are situated between the bark and wood of the spring growth of *Citrus*. The larva hatches later than that of *Eurytoma* and remains within it in the first instar for 9 months. It only begins to feed voraciously when the host larva is mature in the following spring and after consuming its body contents lies ensheathed in its larval skin for a few days. Later it emerges and pupates in the cell in the gall previously occupied by the host. Some weeks later the adult eats its way out of the gall a few days before the last individual of the host emerges.

MARSHALL (Sir G. A. K.). **Four New Derelominae (Col. Curc.).**—*Stylops* **4** pt. 6 pp. 137–140. London, 15th June 1935.

The new weevils described include *Meredolus cocotis*, gen. et sp. n., from male flowers of coconut in the Solomon Islands. Five species of *Derelomus*, including *D. plagiatus*, Fhs., *D. kamerunicus*, Fst., *D. subvittatus*, Fst., and *D. bilineatus*, Hust. [*cf. R.A.E.*, A **23** 293], are transferred to the genus *Prosoestus*.

Franssen (C. J. H.). **De biologie van de zwartbruine aardrups (*Rhyacia ipsilon* Hufn.) en haar biologische bestrijding in het Sengkangsche merengebied (Zuid-Celebes).** [The Biology of the Cutworm, *Agrotis ypsilon*, and its biological Control in the Sengkang Lake District, South Celebes.]—*Landbouw* **10** pp. 109–137, 6 figs., 19 refs. Buitenzorg, 1935. (With a Summary in English.)

Cutworms in Java do not require control, but since 1925 *Agrotis* (*Rhyacia*) *ypsilon*, Hfn., has been harmful in the Sengkang lake district in South Celebes, where 12,000–17,000 acres of lake bottom, which become dry about the beginning of August, are planted with maize, the crop being harvested before the January rains fill the lakes again. Attack by this cutworm may make three sowings necessary, and the consequent delay may cause the crop to be lost in the January floods.

A. ypsilon occurs in Java, Sumatra and Celebes. All stages are described. The egg and larval stages averaged 3 and 36 days, respectively, at Buitenzorg, Java, but only 2½ and 20 in Sengkang. The larvae, which are polyphagous, moult 4 or 5 times. The pupal stage averaged 10 days at Buitenzorg and in Sengkang. The females had a maximum life of 20 days at Buitenzorg and 12 in Sengkang. At Buitenzorg, the average, minimum and maximum numbers of eggs were 973, 30 and 2,371, and in Sengkang 1,434, 395 and 2,775. The sexes were about equal in numbers. The moths were attracted neither by light-traps nor bait-traps. In Java the larvae were most abundant at the end of the rainy season and at the beginning of the dry, and in Sengkang they were numerous in dry lands at the end of the rainy season. When the lakes became dry, they appeared there in large numbers, but disappeared 1½–2 months later, about mid-October. From January onwards they were again present in the dry lands. The eggs were usually laid on ground that was moist or had recently dried. About 300 larvae per sq. yard were found in uncultivated ground on which *Ipomoea reptans* was growing.

Direct control could not be advocated nor was a change in cultural measures practicable. The pupae of the Tachinid parasites, *Goniophana heterocera*, Macq., and *Acuphocera varia*, F., and of the Braconid, *Apanteles ruficrus*, Hal., were therefore introduced in 1929 from Java. In all 1,154 adults, mostly *G. heterocera*, were liberated, but it is not yet known if they have become established. *G. heterocera* lays its eggs on leaves, and they hatch as soon as they have been swallowed by the host larvae. At Buitenzorg the larval stage averaged 10 days in fifth instar larvae of *A. ypsilon*. The puparium was usually formed in the pupa of the host. The pupal stage of the Tachinid lasted 15 days, and the first eggs were laid 9 days after emergence. There was an average of 4,371 eggs per female. *G. heterocera* occurred in the mountainous regions of Java and Sumatra and parasitised a maximum of 62 per cent. of *A. ypsilon*. *Acuphocera varia* is larviparous and deposits its larvae on the leaves, on which they have lived for 15 days in the laboratory. They cut into the skin of the host larvae, and the larval stages in fully grown larvae of *A. ypsilon* averaged 12 days. The puparium was usually formed in the host's pupa. At Buitenzorg the pupal stage took 10 days. Females deposited some 300 larvae each, the first about 11 days after emergence. Six per cent. of *A. ypsilon* were observed to be parasitised. In Java *A. varia* occurred in both plains and mountains, but in Sumatra and Celebes it was found only in the mountains. Another Tachinid, *Stomatomyia acuminata*, Rond., was rather common in

larvae of *A. ypsilon* in the mountain regions of South Celebes, parasitising up to 5 per cent. of them. In the lake district of Celebes the only parasite bred was the Tachinid, *Sturmia inconspicuella*, Baranov, of which 4 were obtained. *Apanteles ruficrus* attacked as many as 50 per cent. of the younger cutworms in mountains in Java, the only place where it was found. At Buitenzorg the egg and larval stages together lasted 17 days, and the pupal stage 3 days. Cutworms collected in Java, Sumatra and Celebes succumbed in large numbers to diseases, which were not investigated.

KUWAYAMA (S.). **Studies on *Lema oryzae* Kuwayama, the Rice Leaf-beetle. IV. Observations on the Biology and Liberation of an Egg-parasite, *Anaphes nipponicus* Kuwayama.** [*In Japanese.*]—*Rep. Hokkaido agric. Exp. Sta.* no. 33, 80+4 pp., 4 pls., 60 refs. Kotoni, Sapporo, Japan, February 1935. (With a Summary in English.)

The egg parasite, *Anaphes nipponicus*, Kuw., is an important factor in the control of *Lema oryzae*, Kuw., which is widely distributed on rice throughout Hokkaido, Honshu and Formosa [*cf. R.A.E.*, A **20** 459]. All stages of this Mymarid are described. In Hokkaido it has 5 or 6 generations a year. The period from oviposition to emergence may last from 8 to 13 days; it took 11 and 9 days at daily mean temperatures of 20·3 and 20·7°C. [68·54 and 69·26°F.], respectively. The adults are present in rice-fields from early June when oviposition by *Lema* has begun until mid-August when it ends. The percentage of parasitism is usually low during the first half of June and increases gradually until the maximum is reached in late July and early August. The females generally oviposit in host eggs deposited 1–3 days previously. Two parasites are frequently found in one egg, and in one case 7 larvae were observed. The egg-stage of the parasite lasts less than 24 hours. Adults remain within the host egg for a day after emergence; they lived about 5 days in mid-July and 1–2½ in early August when confined in a glass vial and fed with diluted honey. Seventy per cent. of 1,608 adults reared in 1934 were females. The number of eggs per individual in 33 females varied from 4 to 51.

Unsuccessful attempts were made during 1931–33 to introduce the parasite from one province to another, but during 1933–34 it became readily established at Enbetsu (Teshio) though hibernation and reproduction were adversely affected by various conditions. Further liberations were made in 1934 in areas already colonised. At Nagayama during June–July the number of adults of *Anaphes* found for every 100 eggs of *Lema* varied from 1·40 to 25·64 near a cage in which parasitised egg-masses were placed and from 1·22 to 11·64 at some distance from it.

RUDORF (W.). **Observaciones sobre la frecuencia de cruzamientos naturales en *Pisum sativum* L. y *Pisum arvense* L. y sobre el comportamiento de diferentes variedades de arvejas con respecto a *Bruchus pisorum* L. (*pisi*, L.).** [Observations on the Frequency of natural Crossings in *P. sativum* and *P. arvense* and on the Behaviour of different Varieties of Peas towards *B. pisorum*.]—*Physis* **11** no. 40 p. 493. Buenos Aires, February 1935. [Recd. May 1935.]

In the neighbourhood of Buenos Aires peas (*Pisum sativum*) are attacked by *Bruchus pisorum*, L., which lays its eggs in the youngest

pods. An investigation of the degree of injury in 53 varieties showed that early blossoming (in the first half of October) saved the plants from serious attack, while late blossoming (in the second half of October) exposed them considerably. Very late varieties, however, also escape attack.

Hempel (A.). **A *Prorops nasuta* Waterston no Brasil.**—*Arch. Inst. biol.* **5** pp. 197–212, 5 figs., 4 pls. S. Paulo, 1934. (With a Summary in English.) [Recd. April 1935.]

The original description of *Prorops nasuta*, Wtrst. [*R.A.E.*, A **11** 456] and Hargreaves' paper on the coffee berry borer, *Stephanoderes hampei*, Ferr., in Uganda [**14** 224] are translated, and an account is given of the introduction of the parasite into the State of S. Paulo, Brazil, in June 1929. Details about parasitisation and the methods of distribution are given [**22** 186]. It was easily acclimatised, and by 30th September 1930 over 30,000 individuals had been distributed to 48 coffee plantations in 10 different localities.

In an addendum, dated 30th June 1934, the Bethylid is said to have spread naturally from the plantations where it was placed to distances of up to about 500 yards. In some plantations during 1933–1934 *S. hampei* only injured 5 per cent. of the crop.

Pinto da Fonseca (J.). **Relação das principais pragas observadas nos anos de 1931, 1932 e 1933, nas plantas de maior cultivo no estado de S. Paulo.** [Report of the principal Pests observed in 1931–1933 on the chief cultivated Plants in the State of S. Paulo.] —*Arch. Inst. biol.* **5** pp. 263–289. S. Paulo, 1934. [Recd. April 1935.]

In this catalogue brief notes on the distribution in S. Paulo of most of the pests and on the nature of the injury they cause are given. They are arranged under their food-plants as follows :—

Coffee (*Coffea arabica*) : the Cicadids, *Carineta fasciculata*, Germ., *Fidicina pullata*, Berg, *F. drewseni*, Stål, *F. mannifera*, F., and *Quesada sodalis*, Wlk., *Coccus viridis*, Green, *Saissetia coffeae*, Wlk. (*hemisphaerica*, Targ.), *Pseudococcus citri*, Risso, *Stephanoderes hampei*, Ferr., *Macrodactylus suturalis*, Mann., *Euphoria lurida*, F., *Araecerus fasciculatus*, DeG., *Mocis repanda*, F., *Leucoptera coffeella*, Guér., *Ceratitis capitata*, Wied., *Anastrepha fraterculus*, Wied., *Lonchaea pendula*, Bezzi, *Atta* spp. and *Acromyrmex* spp. Cotton (*Gossypium barbadense*) : *Alabama argillacea*, Hb., *Platyedra gossypiella*, Saund., *Dysdercus ruficollis*, L. *Aphis gossypii*, Glov., *Gasterocercodes gossypii*, Pierce, and larvae of *Agriotes* spp. *Hibiscus bifurcatus* : *Rutela lineola*, L., *Naupactus rivulosus*, Mann., *Colaspis* sp., and *Anomis doctorium*, Dyar. Rice : Pyralids, probably of the genus *Crambus*, and the Coccid, *Pseudococcus citri*. Sugar-cane : *Diatraea saccharalis*, F., *Laphygma frugiperda*, S. & A., a Cydnid bug, *Scaptocoris* sp., *Pseudococcus boninsis*, Kuw., *P. citri*, *P. brevipes*, Ckll. (*bromeliae*, auct.), *Aphis sacchari*, Zehnt., *Tomaspis liturata*, Lep. & Serv., and a Cerambycid. Maize : *Laphygma frugiperda*, *Mocis repanda* and *Heliothis* (*Chloridea*) *obsoleta*, F. Tobacco : *Protoparce sexta*, Joh., *Phthorimaea operculella*, Zell., *Epitrix parvula*, F., *E. cucumeris*, Harr., *Collabismodes tabaci*, Mshl., *Brevicoryne brassicae*, L., and *Pieris monuste*, L. Potato : *Epicauta atomaria*, Germ., *E. excavata*, Klug,

E. adspersa, Klug, *Laphygma frugiperda*, *Feltia annexa*, Treit., *Xyolmyges* (*Prodenia*) *eridania*, Cram., *Agrotis ypsilon*, Hfn., and a Curculionid, probably *Euxenus* sp. Tomato : a Pentatomid, *Edessa* sp., *Corecoris fuscus*, Thunb., *Leucinodes elegantalis*, Gn., and *Collabismodes tabaci*. Cassava (*Manihot utilissima*) : *Erynnis ello*, L., *Lonchaea pendula*, *Atherigona excisa*, Wied., and *Aleurothrixus aepim*, Goeldi. Cucurbits : *Aphis gossypii*, *Diaphania nitidalis*, Stoll, *D. hyalinata*, L., *Diabrotica bivittata*, F., *D. speciosa*, Germ., the Lamiid, *Adetus muticus*, Thoms., the Coccinellid, *Solanophila clandestina*, Muls., and *Anastrepha grandis*, Macq. *Citrus* spp. : *Chrysomphalus ficus*, Ashm. (*aonidum*, auct.), *Lepidosaphes pinnaeformis*, Bch., *Pinnaspis minor*, Mask., *P. aspidistrae*, Sign., *Coccus hesperidum*, L., *Saissetia coffeae*, *Pseudococcus citri*, *Icerya purchasi*, Mask., *I. floccosa*, Hemp., *Pulvinaria flavescens*, Brèthes, *Parlatoria pergandei*, Comst., *P. proteus*, Curt., *Morganella maskelli*, Ckll., *Pseudaonidia trilobitiformis*, Green, *Aspidiotus scutiformis*, Ckll., *Aleurothrixus floccosus*, Mask., the Membracids, *Aethalion reticulatum*, L., *Hoplophorion* (*Metcalfiella*) *pertusa*, Germ., and *H.* (*M.*) *vicina*, Fairmaire (*fimbriata*, Stål), *Toxoptera aurantii*, Boy., *Ceratitis capitata*, *Macrodactylus suturalis*, *M. affinis*, Lap., *M. pumilio*, Burm., *Naupactus paulanus*, Hell., *Cratosomus reidii*, Kby., *C. fasciatus*, Perty, *Phyllocoptes oleivorus*, Ashm., *Melipona ruficrus*, Latr., *Diploschema rotundicolle*, Serv., *Macropophaga accentifer*, Ol., *Rhopalophora collaris*, Germ., *Papilio anchysiades capys*, Hb., *P. thoas brasiliensis*, Roths. & Jord., *Gymnandrosoma aurantianum*, Costa Lima, and some species of Tettigoniids. Lucerne and grasses : *Laphygma frugiperda* and *Mocis repanda*. Avocado (*Persea gratissima*) : *Heilipus catagraphus*, Germ., *Cratosomus phaleratus*, Perty, and *Selenothrips* (*Heliothrips*) *rubrocinctus*, Giard. Pineapple : *Tmolus* (*Thecla*) *echion*, L., *T.* (*T.*) *legota*, Hew., and *Pseudococcus brevipes*. Mulberry (*Morus nigra*) : *Aulacaspis pentagona*, Targ., and *Membracis dorsata*, F. Banana : *Cosmopolites sordidus*, Germ., *Pentalonia nigronervosa*, Coq., and the Blattid, *Hormetica laevigata*, Burm. Fig (*Ficus carica*) : the Pyralid, *Azochis gripusalis*, Wlk., and the Cerambycid, *Taeniotes scalaris*, F. Custard apple (*Anona reticulata*) : a thrips and *Cerconota* (*Stenoma*) *anonella*, Sepp. *Myrciaria jaboticaba* : the Cerambycid, *Eurymerus eburioides*, Serv., *Capulinia jaboticabae*, von Iher., *C. crateraformans*, Hemp., *Pendularia pendens*, Pinto da Fonseca, *Pseudococcus grandis*, Hemp., *Eriococcus perplexus*, Hemp., *Ceroplastes janeirensis*, Gray, *Stictolecanium ornatum*, Hemp., *Ceratitis capitata*, and a Cynipid, *Myrtopsen* sp. Papaya (*Carica papaya*) : *Morganella maskelli*. *Passiflora alata* : the Coreid, *Diatos bilineatus*, F., *Anastrepha grandis* and *A. fraterculus*. Apple : *Aspidiotus perniciosus*, Comst., *A. symbioticus*, Hemp., *A. cydoniae*, Comst., *Eriosoma lanigerum*, Hsm., and *Stenoma albella*, Zell. Peach : *Morganella maskelli*, *Aulacaspis pentagona*, *Anuraphis prunicola*, Kalt., *A. persicae-niger*, Smith, *Ceratitis capitata*, and *Anastrepha fraterculus*. Pear : *Aspidiotus symbioticus*, *A. cydoniae*, *Stenoma albella* and *Platypus* sp. Japanese medlar (*Eriobotrya japonica*) : *Aspidiotus perniciosus*, *Morganella maskelli*, *Anuraphis prunicola*, *A. persicae-niger*, *Stenoma albella*, and *Ceratitis capitata*. Grape-vine (*Vitis vinifera*) : *Phylloxera* (*Perytimbia*) *vitifolii*, Fitch (*vastatrix*, Planch.), *Aspidiotus cydoniae*, *A. lataniae*, Sign., *A. pentagona*, *Neolecanium silveirai*, Hemp., *Lecaniodiaspis rugosa*, Hemp., the Rutelid, *Bolax flavolineatus*, Mann., the Bostrychid, *Zylopsocus capucinus*, F., and *Colaspis trivialis*, Boh. Orchids : the Capsid, *Tenthecoris bicolor*,

Scott, *Eurytoma orchidearum*, Westw., *Diaspis boisduvalii*, Sign., and *Cerataphis lataniae*, Boisd.

Bence Pieres (R.). **La *Icerya purchasi* en Concordia y su control por el *Novius cardinalis*.**—*Bol. Minist. Agric. Argent.* **36** no. 3 pp. 235–243, 4 figs., 1 map. Buenos Aires, 1934. [Recd. May 1935.]

By 1927 infestation of *Citrus* and forest trees by *Icerya purchasi*, Mask., which had apparently been brought with plants from Uruguay, had become general and serious in the district of Concordia, Argentina. The Coccinellid, *Rodolia* (*Novius*) *cardinalis*, Muls., was then imported from Uruguay and has controlled the scale. An account is given of the life-history of this Coccinellid and of the steps taken to spread it in Concordia.

Gambrell (F. L.). **Control of the Spruce Gall Aphid in Nursery Plantings.**—*Tech. Bull. N.Y. St. agric. Exp. Sta.* no. 225, 55 pp., 18 figs., 17 refs. Geneva, N.Y., December 1934. [Recd. May 1935.]

The following is mainly taken from the author's summaries of investigations on the bionomics of *Chermes* (*Adelges*) *abietis*, L. (spruce gall aphis) and its control on several species of spruce in New York [*cf. R.A.E.*, A, **19** 479 ; **21** 316, etc.]. In tests carried out from 1928 to 1933 satisfactory results were obtained with one application of the following materials in 100 U.S. gals. spray mixture : 2½ U.S. gals. lime-sulphur ; 1 or 2 U.S. gals. tar distillate ; I U.S. pt. nicotine sulphate and 2 or 3 lb. soap ; 10 lb. fish oil or laundry soap ; 1 U.S. gal. lubricating oil (viscosity 100 secs., unsulphonated residue 60–70 per cent.) emulsified with Bordeaux mixture (2–2–100) or with 1 lb. calcium caseinate or lignin pitch. Miscible oils diluted according to the makers' directions and a 2 per cent. nicotine dust were also effective. With the exception of oil sprays, which should be applied in the spring to avoid injuring the foliage, the treatments should be made either in autumn after all the eggs have hatched, or in the spring before the overwintering nymphs resume their activity. Even when oil sprays are applied in the spring, the foliage may be injured, and it is safer not to use them on choice spruces. Sprays should not be applied if frost is likely before the trees become thoroughly dry. Nicotine dusts and sprays are more effective on calm days when the temperature is 55°F. or more. Insecticides should be applied with particular thoroughness to the terminal growth and lower surfaces of the tips of the lateral branches.

The measures against *C. abietis* are also effective against *C.* (*Gillettia*) *cooleyi*, Gill. (Sitka gall aphis), which attacks Colorado blue spruce (*P. pungens*) and Douglas fir [*Pseudotsuga taxifolia*] [*cf.* **22** 665, etc.].

Priesner (H.). **Indomalayische Thysanopteren (VI.).**—*Natuurk. Tijdschr. Ned.-Ind.* **94** no. 3 pp. 254–290. Batavia, 1934.

This paper describes 14 new species and 4 new varieties of *Thrips* from Indo-Malaya and includes a key to the " dark " species of the genus of this district. The new subgenus *Saccharothrips* is erected for *T. serratus*, Kobus, from sugar-cane in Formosa, and the new varieties

include *T. sumatrensis cinchonae* from flowers of *Cinchona ledgeriana* in Java.

SNYDER (T. E.). **An introduced Anobiid Beetle destructive to Houses in the Southern States.**—*Proc. biol. Soc. Wash.* **48** no. 14 pp. 59–60, 1 pl., 2 refs. Washington, D.C., 3rd May 1935.

The European Anobiid, *Nicobium castaneum* var. *hirtum*, Ill., which has long been established in the Gulf States, is now present in South Carolina and Virginia. It occurs most commonly in old, well-seasoned furniture, but also attacks the yellow-pine woodwork of buildings. Adults were reared in Washington in June 1932 from an old piece of furniture from South Carolina. The eggs took 10–14 days to hatch.

BORCHERT (A.). **Zur Biologie der Grossen Wachsmotte (*Galleria mellonella* L.). ii. Ueber den Frassschaden und die Ernährung der Larven der Grossen Wachsmotte (*Galleria mellonella* L.).** [On the Biology of the large Wax Moth. ii. The Damage caused by Feeding and the Nourishment of Larvae of the large Wax Moth.]—*Zool. Jb.*, Abt. Syst. **66** no. 5 pp. 380–400, 1 pl., 3 refs. Jena, 8th April 1935.

This second paper [*cf. R.A.E.*, A **21** 381] on *Galleria mellonella*, L., gives the results of laboratory investigations made in Germany to determine the amount of damage done to combs of the honey-bee by each larval instar, the amount of comb consumed by a single larva, and on what material, other than its normal food, a larva can feed and develop. The amount of food taken in 24 hours was ascertained for instars 4 to 9 and ranged from 2 to 43·6 mg., respectively. The comb is the normal food of the larva, but partial development occurred with a variety of foods, including cereals, pulses, etc. Feeding without development occurred on cork, peat, coffee-wax and rubber. Larvae of the 7th instar fed on all material submitted, but completed development only in honey-cakes.

SASAKI (C.). **On a new Phorid-fly infesting our Edible Mushroom.**—*Proc. imp. Acad. Japan* **11** no. 3 pp. 112–114, 5 figs. Tokyo, March 1935.

The Phorid, *Megaselia* (*Aphiochaeta*) *matsutakei*, sp. n., all stages of which are described, is widely distributed in Japan, where it attacks an edible mushroom, *Armillaria matsudake*. It has one generation a year, the adults generally occurring in September–November. Apparently, the eggs are deposited on the pileus of the mushroom, and the larvae make their way to the base of the stipe and pass through it. On emerging from the mushroom, they pupate in soil or among fallen pine needles and hibernate there.

WELLMAN (F. L.). **The Host-Range of the Southern Celery-Mosaic Virus.**—*Phytopathology* **25** no. 4 pp. 377–404, 13 refs. Lancaster, Pa, April 1935.

The following is taken from the author's summary of investigations in Florida: Inoculation experiments, supplemented by studies of symptoms and field observations showed that the southern celery-mosaic virus (celery virus 1) may infect at least 91 different wild and

cultivated plants. The susceptible plants, 46 of which were found naturally infected in the field, included various celeries, maize, cucumber, broad beans, bananas, *Sorghum*, tobacco, etc. Various cabbages and mustards, garden and field beans, garden peas, etc., were not affected.

TINKHAM (E. R.). **Preliminary Notes on injurious Rice Grasshoppers of the Genus *Quilta* Stål from South China and Cochin China (Orthoptera : Acrididae).**—*Lingnan Sci. J.* **14** no. 2 pp. 321–325, 2 refs. Canton, 1st April 1935.

Morphological data are given on 14 individuals of *Quilta* discovered in rice-fields in Cochin China and Kwantung, this latter record being the first for this rare genus in China. They probably represent 3 or even 4 species, including *Q. mitrata*, Stål, from Kwantung, and *Q. oryzae*, Uvarov, and a new one from Cochin China. Members of this genus appear to be specific to rice-fields and are able to swim. They oviposit at the base of the leaf. Their economic importance has not been ascertained.

CHEN (Kao-ziang). **Notes on the Submerging of *Scotinophara lurida* Egg Masses in Relation to their Parasites.** [*In Chinese.*]—*Ent. & Phytopath.* **2** no. 32–33 p. 647. Hangchow, 21st November 1934. (Abstr. in *Lingnan Sci. J.* **14** no. 2 pp. 352–353. Canton, 1st April 1935.)

In China 32·3 per cent. of the eggs of *Scotinophara lurida*, Burm., on rice, etc., are attacked by parasites. Data indicate that submergence of the egg masses [*cf. R.A.E.*, A **22** 548] for 16 hours does not usually prevent the eggs from hatching, whereas submergence for over 24 hours affects the emergence of adult parasites.

LIU (Kwoh-si) & HWANG (Chung-chiang). **Notes on the Life History of the Cotton Locust, *Cyrtacanthacris rosea* De Geer (Orthop., Locustidae).** [*In Chinese.*]—*Ent. & Phytopath.* **3** no. 2 pp. 32–33. Hangchow, 11th January 1935. (Abstr. in *Lingnan Sci. J.* **14** no. 2 p. 368. Canton, 1st April 1935.)

In China, *Chondacris* (*Cyrtacanthacris*) *rosea*, DeG., has one generation a year and feeds on the flower buds, blossoms and bolls of cotton. Eggs collected in the field hatch in early June. The hoppers mature in about 60 days. The adults pair after about 10 days, begin to oviposit a week later and live about 50 days. Females lay 120–300 eggs each. The egg-pods are placed 2 or 3 inches deep in the soil.

LU (King-lo). **Notes on the Life-history and Control Measures of an Aleurite Leaf-feeder in Nienchow (Lep., Geometridae).** [*In Chinese.*]—*Ent. & Phytopath.* **2** no. 35 pp. 688–692. Hangchow, 11th December 1934. (Abstr. in *Lingnan Sci. J.* **14** no. 2 p. 369. Canton, 1st April 1935.)

Notes are given on the bionomics of a Geometrid, the larvae of which feed on the leaves of tung oil trees [*Aleurites*] in Chekiang. It has two generations a year and overwinters in the pupal stage. The moths emerge in April and July.

Ma (Tsing-chao). **A new Food Plant of** *Atractomorpha ambigua* **Bolivar.** [*In Chinese.*]—*Ent. & Phytopath.* **2** no. 34 pp. 671–672. Hangchow, 1st December 1934. (Abstr. in *Lingnan Sci. J.* **14** no. 2 p. 370. Canton, 1st April 1935.)

Atractomorpha ambigua, Bol., was discovered in October feeding on the leaves of ginger [*Zingiber officinale*] in an experimental plot in China.

Saito (K.). **On some Problems of "Dendro-entomology," II.** [*In Japanese.*]—*Oyo-Dobuts. Zasshi* **7** no. 2 pp. 70–74. Tokyo, March 1935.

Observations in Korea showed that the time at which the buds of trees burst in spring has a marked effect on the insects that feed on them. In nurseries, the buds of *Populus monilifera* open earlier than those of *P. nigra*, and it is therefore more susceptible to injury by *Melasoma* (*Chrysomela*) *populi*, L., the adults of which appear in early spring. The adults of the sawfly, *Tomostethus nigritus*, F., emerge in the first half of April and oviposit on *Fraxinus mandshurica*, but not on *F. americana*, since the latter is dormant until early May. For similar reasons the buds of *Euonymus striata* var. *alata* are slightly injured by the larvae of *Pryeria sinica*, Moore. *Ulmus parvifolia* is not attacked by *Byrsocrypta* (*Tetraneura*) *gallarum yezoensis*, Mats., in spring, since its leaves do not appear until early May, and Aphids hatched earlier from eggs on the tree cannot live. *Dendrolimus spectabilis*, Butl., which prefers pines that have tender leaves with much sap, damages *Pinus koraiensis* most severely and does more harm to *P. densiflora* than to *P. thunbergi*. Generally, trees that grow fast are less injured by an insect that is limited to a particular stage in their development. *Pinus rigida* has a marked ability to recover from attacks on the buds and is suitable to conditions in Korea, where damage by *Dendrolimus spectabilis* and forest fires are common. Seedlings of *P. koraiensis* are more resistant to Lamellicorn larvae since they form roots readily.

Oda (F.). **Studies on** *Schoenobius incertellus* **Walk. in Japan.** [*In Japanese.*]—*Oyo-Dobuts. Zasshi* **7** no. 2 pp. 75–87. Tokyo, March 1935.

A historical account is given of the injury caused to rice by *Schoenobius bipunctifer*, Wlk. (*incertellus*, Wlk.) in Japan. Such injury was first recorded in 1751, and in 1933 caused a loss of 2 per cent. of the rice crop.

Nakayama (S.). **On the Biology of** *Ephestia elutella* **Huebner.** [*In Japanese.*]—*Dobuts. Zasshi* **47** no. 557 pp. 193–195. Tokyo, 1935.

The Pyralid, *Ephestia elutella*, Hb., is widely distributed as a pest of stored tobacco in Korea. Near Suigen, there are 2, and sometimes 3, broods a year, and hibernation usually takes place in the larval stage. Adults emerge in May–June and from late July to mid-September; a few are also seen in October. They live 4–28 days and are but little attracted to light. The females begin to oviposit upon the tobacco 2 or 3 days after they emerge, laying on an average 84 eggs, which hatch in 4–7 days. The larvae mature in about 45 days in summer, moulting

4 or 5 times. When they feed on threshed rice, the larval period is somewhat shorter. The pupal stage lasts 6–27 days.

MURAYAMA (J.). **On the Biology of some Korean Scarabaeidae.** [*In Japanese.*]—*Dobuts. Zasshi* **47** no. 557 pp. 195–197. Tokyo, 1935.

During 1927 and from 1930 to 1933, over 20,000 adults of 47 species of Lamellicorns were collected at night near Keijo, Korea, of which the majority were *Lachnosterna* (*Holotrichia*) *diomphalia*, Bates, *L.* (*H.*) *titanis*, Reitter, and *Miridiba koreana*, Niij. & Kino, coming next in abundance. During 1925–1930 and 1933, over 10,000 adult beetles, belonging to 25 species, were collected less than 40 ins. below the surface of the ground. Over half were *Anomala* (*Phyllopertha*) *pallidipennis*, Reitter, and 15 per cent. *L. diomphalia*. The adults of *A. pallidipennis* emerge from mid-June to August, but mostly in mid-July. They live for 7–10 days and do not feed. Each female lays 1–40 eggs, which hatch in 14–15 days. The larvae, which feed on the roots of a wide range of plants, including ash, elm, oak, pine and *Thuja*, moult three times. The winter is usually passed in the third instar which lasts 231–305 days. Sometimes it is passed in the first instar, but in this case 86 per cent. do not reach the adult stage. The larvae are found near the surface during summer, but are 8–24 ins. below it in autumn and winter. They die at —9°C. [15·8°F.] when near the surface, but survive —16°C. [3·2°F.] or —20°C. [—4°F.] when the surface is covered with weeds or fallen leaves. The pupal stage lasts 6–15 days. The eggs of *Lachnosterna diomphalia* are laid after April or May and hatch in 12–19 days. The larvae, which moult three times, mature in spring, and the adults usually live over a year.

KABURAKI (T.). **On some useful and injurious subterranean Nematodes.** [*In Japanese.*]—*Dobuts. Zasshi* **47** no. 557 pp. 213–215. Tokyo, 1935.

A Rhabditid Nematode related to *Cephalobus* is parasitic in the larva and pupa of *Mimela* (*Anomala*) *testaceipes*, Motsch. The life-cycle is completed in 5 days at 15°C. [59°F.].

KOIDSUMI (K.). **Experimental Studies on the Influence of Low Temperatures upon the Development of Fruit-flies. Fifth Report. Effect of varying low Temperatures upon the Emergence of Larvae and Pupae of the Melon Fly** (*Chaetodacus cucurbitae* **Coq.).** [*In Japanese.*]—*J. Soc. trop. Agric.* **6** no. 3 pp. 495–504. Taihoku, Formosa, November 1934. **Sixth Report. On the Velocity, favourable Temperature and Threshold of Development of the Eggs, Larvae and Pupae of a Citrus Fruit-fly** (*Chaetodacus ferrugineus dorsalis*, **Hendel**). [*In Japanese.*]—*T.c.* no. 4 pp. 687–696. December 1934.

In further experiments on *Dacus* (*Chaetodacus*) *curcurbitae*, Coq., in Formosa [*cf. R.A.E.*, A **22** 519], the pupae and larvae were exposed to two temperatures alternately for successive periods of 12 hours. The pupae were killed by the following alternations in temperature : —6°C. [21·2°F.] and 12°C. [53·6°F.] for 1 day, —3°C. [26·6°F.] and 15°C. [59°F.] for 2 days, 0°C. [32°F.] and 21°C. [69·8°F.] for 40, 3°C. [37·4°F.] and 15°C. for 24, or 6°C. [42·8°F.] and 15°C. for 36. They were not

killed by 0°C. and 21°C. or 3°C. and 18°C. [64·4°F.]. Thus they died when the average temperature was 10·5°C. [50·9°F.] or less, and survived when it was 12°C. [53·6°F.] or more. The larvae were killed by alternate exposure to 0 and 21°C. for 20 days or 3 and 21°C. for 40, but survived at 0 and 30°C. [86°F.]. Thus they died at average temperatures of 12°C. or below, but survived at 15°C. or above. The larvae and pupae were less resistant to varying temperatures than to constant low temperatures.

In the experiments with *Dacus* (*Chaetodacus*) *dorsalis*, Hend., the eggs, larvae and pupae were exposed to constant temperatures between 10°C. [50°F.] and 38°C. [100·4°F.]. All stages could develop at temperatures between 11°C. [51·8°F.] and 34°C. [93·2°F.], and the pupae at 36°C. [96·8°F.]. The favourable temperatures for the eggs and larvae were above 12°C. and for the pupae 14–32°C. [57·2–89·6°F.]. The development of the immature stages was most rapid at 30°C.

TAKAHASHI (R.). **Economic Aspects of the Formosan Thrips.** [*In Japanese.*]—*J. Soc. trop. Agric.* **7** no. 1 pp. 67–78, refs. Taihoku, Formosa, March 1935.

Of the 100 species of thrips known in Formosa few are injurious. An account is given of the bionomics of these insects and the injury they cause. The 29 species recorded as attacking cultivated plants include *Anaphothrips flavicinctus*, Karny, on Italian millet [*Setaria italica*], *Sorghum* and other graminaceous plants, *Ayyaria chaetophora*, Karny, on cotton and beans, *Taeniothrips smithi*, Zimm., in the flowers of orchids, *Scirtothrips dorsalis*, Hood, on mango (and tea in Japan), *Thrips clarus*, Moult., in various flowers and on the leaves of cotton, *Litotetothrips rotundus*, Moult. (*cinnamomi*, Priesn.) in buds of camphor [*Cinnamomum camphora*], *Haplothrips chinensis*, Priesn., in flowers of various plants, and *Rhaebothrips lativentris*, Karny, on cotton.

Thrips hawaiiensis, Morgan (*albipes*, Bagn.) is common and attacks the flowers of various plants, but only causes serious damage to those of poppy. *Heliothrips haemorrhoidalis*, Bch., which is also common, attacks a wide range of plants, including *Citrus*, coffee, cotton, camphor, and *Areca catechu*, and sometimes defoliates persimmon (*Diospyros kaki*). It is invariably parthenogenetic. *Selenothrips rubrocinctus*, Giard, is sometimes abundant, and feeds on persimmon, alder, oats, *Acacia*, etc. *Thrips tabaci*, Lind., is the most important pest among these insects in the Island, where, however, it apparently only occurs on onions. No males have been found in Formosa.

KAMBE (T.). **List of Insect Pests of Cotton in Chosen and other Countries.** [*In Japanese.*]—*Ann. agric. Exp. Sta. Chosen* **7** no. 4 pp. 359–404. Suigen, Korea, December 1934. (With a Summary in English.)

Very brief notes are given on the feeding habits and seasonal occurrence of 45 insects that attack cotton in Korea. *Platyedra* (*Gelechia*) *gossypiella*, Saund., *Aphis gossypii*, Glov., and *Tetranychus telarius*, L. (*bimaculatus*, Harv.), are the most injurious, and the others include *Tortrix* (*Cacoecia*) *longicellana*, Wals., *Sylepta derogata*, F., *Agrotis ypsilon*, Hfn., *Euxoa* (*A.*) *segetum*, Schiff., *Luperodes quadriguttatus*, Motsch., *Popillia uchidae*, Niij. & Kino., and *Maladera* (*Serica*) *orientalis*, Motsch. A list is also given of cotton insects in other oriental

countries, and of the more important ones in other parts of the world, with a table showing their distribution.

MUGGERIDGE (J.). **Progress of the Control of the White Butterfly by** *Pteromalus puparum*.—*N.Z. J. Agric.* **50** no. 3 pp. 175–176. Wellington, N.Z., 20th March 1935.

Surveys of the occurrence of *Pteromalus puparum*, L., following its liberation against the white butterfly [*Pieris rapae*, L.] in New Zealand [*R.A.E.*, A **22** 724, etc.] showed that by the early part of 1935 it had spread widely and had effected a high degree of control in the Hawke's Bay area, where all the large colonies had been released. In other parts of North Island, particularly in the south-west, the butterfly has increased unchecked, with the consequent destruction of cruciferous crops over wide areas. Large colonies have been released in many of these localities, and satisfactory control is expected in from one to two years.

GLOVER (P. M.). **Lac Cultivation and the Shellac Industry.**—*Tisco Rev.* 1935 reprint 9 pp., 13 figs. Calcutta, January 1935. [Recd. May 1935.]

A general account is given of the shellac industry in India with particular reference to the cultivation of *Laccifer lacca*, Kerr [*cf. R.A.E.*, A **20** 10]. The work of Indian Lac Research Institute is outlined [*cf.* **23** 248; etc.]

PUTMAN (W. L.). **Notes on the Native Hosts of Some Oriental Fruit Moth Parasites.**—*Canad. Ent.* **67** no. 3 pp. 46–49, 5 refs. Orillia, March 1935.

Recent work on the hosts of the parasites that attack the oriental fruit moth, *Cydia* (*Grapholitha*) *molesta*, Busck, is briefly reviewed [*cf. R.A.E.*, A **19** 204; **22** 177; **23** 169]. In Ontario in 1934, 40 per cent. of the ragweed plants (*Ambrosia artemesiaefolia*) in an orchard were infested by the first generation larvae of *Epiblema strenuana*, Wlk., about 30 per cent. of which were parasitised by *Glypta rufiscutellaris*, Cress. The latter emerged between 1st August and 10th September. In January 1935, 8 per cent. of the overwintering larvae were parasitised. In Ontario *G. rufiscutellaris* is chiefly a parasite of the second generation of *C. molesta*, only a small proportion of the first generation being attacked. The second generation does not appear until July. As in 1934 the parasite had completed emergence from the winter generation of *E. strenuana* before 14th May, it must produce its first generation on some native host. In 1933 an early generation emerged between 19th and 23rd June from a Lepidopterous leaf tier on hawthorns (*Crataegus* spp.) and from *Argyrotoxa semipurpurana*, Kf., a leaf-roller on oak. The percentage of parasitism was rather high in the former species, which was very abundant on certain species of hawthorn in May and early June. *Cremastus minor*, Cush., emerged in small numbers from *E. strenuana* between 20th August and 1st September. Ten per cent. of the first generation larvae of *E. strenuana* were parasitised by *Macrocentrus delicatus*, Cress., which is of little value against *C. molesta* in Ontario. The adults emerged in August and September. Several of the same species emerged in June from small collections made in the spring of 1934, and 10 per cent. of the larvae of *E. strenuana*

dissected in January 1935 were parasitised by a species of *Macrocentrus*, probably *delicatus*. A list is given of minor or occasional parasites of *C. molesta* reared from other hosts during 1932–4.

WALLEY (G. S.). **Five new Species of Braconidae with Host Records of additional Species.**—*Canad. Ent.* **67** no. 3 pp. 55–61. Orillia, March 1935.

The species recorded, all of which are from Canada, include *Microgaster peroneae*, sp. n., reared from *Peronea variana*, Fern., in Nova Scotia, and *Microbracon laspeyresiae*, sp. n., from *Enarmonia* (*Laspeyresia*) *caryana*, Fitch, in Ontario.

[**Entomology.**]—*Bull. Maine agric. Exp. Sta.* no. 377 pp. 351–356, 375–381, 401–405, 4 figs. Orono, Me, December 1934. [Recd. April 1935.]

In two cases in Maine during 1934 a mosaic disease spread from a potato field to a seed plot, the distances being about 250 and 700 ft., respectively, and in both a decided increase in the numbers of *Myzus persicae*, Sulz., was observed in the plots shortly after the death of the plants in the commercial fields. On a farm, where *Aphis rhamni*, Boy. (*abbreviata*, Patch) had become numerous in July, over 75 per cent. of the units rogued for mosaic were removed in August, and it appears that infection was made possible during the current season by the severe attack of the Aphids. Small numbers of *M. persicae* and *Macrosiphum solanifolii*, Ashm., were present in August, but probably appeared too late to be involved in the transmission of the disease. Aphids were found earliest and in greatest numbers on plots nearest woods and swamps and latest on those on cleared uplands. In the following year, however, the disease was more severe on the upland plots because they were infested late and were nearer badly diseased fields. Wind, which apparently carries winged and wingless Aphids a long way, may be a factor in the spread of virus diseases.

The increase in yield was not sufficient to warrant the addition of arsenicals to Bordeaux in late sprays against flea-beetles on potatoes.

Two well-timed sprays of calcium arsenate successfully controlled the apple fruit-fly [*Rhagoletis pomonella*, Walsh] in commercial orchards under favourable conditions during the summer. Failures were usually attributable to late migration from neglected trees. Fallen fruit should be removed twice a week in the case of early and autumn apples, and every 7–10 days in that of winter ones, which are much less susceptible to infestation. An average of 3–4 larvae may develop in each apple in susceptible varieties. The time of adult emergence appeared to be more influenced by the soil temperature than by the date of maturity of the fruit in which larvae had developed. Adults appeared 10–13 days earlier in sunny than in shady areas. Of over 50,000 larvae, 30–40 per cent. have given rise to adults after 1 year, about 2 per cent. after 2, and 0·1 per cent. after 3. A trap consisting of a 75-watt Mazda electric light surrounded by a cage of electrically charged wires appeared to effect some reduction in the injury to apples by insects other than *Rhagoletis* and might be a useful supplement to sprays.

Wireworms often cause serious injury to 30 per cent. of the tubers in some potato fields. The number of individuals taken in samples of

$3\frac{1}{3}$ sq. yds. surface area in experimental plots towards the end of September is correlated with the number of injured tubers and the average number of punctures on every 25 tubers. By comparing the numbers of larvae sifted from samples with the tabulated data, it is possible to estimate the amount of damage that would be caused if potatoes were grown on infested soil. Wireworms occur in fields and gardens over the greater part of Maine and seem to be most abundant where clay predominates or in low-lying areas [*cf. R.A.E.*, A **23** 323]. A list is given of the plants attacked. Although meadow grasses and cereals sown broadcast are often severely injured, they usually survive because of the relatively large number of plants within a given area. Beans are among the immune crops [*cf.* **18** 480]. The eggs of *Agriotes mancus*, Say, are laid from early June to August [*cf.* **17** 70] and hatch in about 2 weeks. Most crops can be planted with relative safety after 3 years' cultivation, and after that the kind of rotation makes little difference, so long as a broadcast grain crops are not grown too often and the soil is not again seeded to grass.

SANBORN (C. E.), YOUNG (H. C.), HIXSON (E.), SCHOLL (E. E.) & STILES (C. F.). **History and Control of the Boll Weevil in Oklahoma.**—*Bull. Okla. agric. Exp. Sta.* no. 222, 32 pp., 8 figs., 1 ref. Stillwater, Okla., June 1934. [Recd. May 1935.]

An account is given of work carried out in Oklahoma during 1921–34 on the control of the cotton boll weevil [*Anthonomus grandis*, Boh.], the bionomics of which are outlined. Cultural measures [*cf. R.A.E.*, A **15** 138] are recommended, supplemented where necessary by the application of a calcium arsenate dust every 4–5 days after the infestation has reached 10 per cent. [*cf.* **21** 509].

ANTONY (M. V.). **Apparatus for dusting Sulfur on Plants in controlled Amounts.**—*Science* **81** no. 2102 p. 364, 1 fig. New York, 12th April 1935.

An apparatus for dusting small amounts of sulphur on to the lower surface of leaves in the laboratory is described and figured. It consists of a dust gun made from a glass cylinder 80 mm. by 15 mm. fitted with two corks. A metal tube, with a diameter of 1 mm., passing through one of the corks, admits air under 20 lb. pressure controlled by a valve. A glass tube of the same diameter leads through the other cork into a rubber tube connected with the dusting chamber, which consists of a large wooden box enclosing a tin turned by means of a gramophone turn-table and held at an angle of 45° with the open end down. A plant grown in a flower pot is put in the revolving tin. The sulphur enters the dusting chamber, hits a glass plate and diffuses evenly over the revolving plant.

GATES (F. C.). **Paradichlorobenzene, an effective Herbarium Insecticide.**—*Science* **81** no. 2105 pp. 438–439. New York, 3rd May 1935.

The author records the successful use of paradichlorobenzene to control insect pests in herbaria in Kansas. To kill the eggs it is necessary to maintain a highly saturated atmosphere for two weeks.

Subrahmania Ayyar (T. V.) & Anantanarayanan (K. P.). **A short Note on Tobacco Decoction as an economic Spray Material for Paddy Thrips.**—*Madras agric. J.* **23** no. 3 pp. 100–102. Coimbatore, March 1935.

Under certain climatic conditions in Madras, *Thrips oryzae*, Williams, reproduces in large numbers and seriously damages or even destroys rice seedlings. Such infestations, which are confined to small, compact seed beds, are characterised by the rolling up of the leaves and the rather parched appearance of the beds. Seedlings planted in July 1934 in fields with irrigation channels became infested after about 22 days, and the thrips were increasing and spreading to neighbouring plots. The older seedlings and those belonging to varieties with broader and thicker leaves were practically free from damage, although they were in the middle of the infested area. As flooding was impracticable, the affected area (about an acre) was treated with a spray prepared by soaking 5 lb. tobacco for 24 hours in 5 gals. water, straining the liquid and diluting it at the rate of 1 : 6. Many thrips, dead or dying, at once fell into the water and after about 2 hours the numbers had been considerably reduced. Those that were still alive were concentrated at the top of the curled leaves where they were probably out of reach of the spray. According to a further examination after 3 days, the total mortality was 97 per cent. The adults were comparatively more numerous, possibly because some had migrated from untreated plots, some that had seemed to be dying had recovered or some of the nymphs had matured. This spray is particularly recommended for rice seed beds where water is not readily available for flooding.

Headlee (T. J.). **Some Observations on the Effect of Radio Waves on Insects and Plant Hosts.**—*Bull. N.J. agric. Exp. Sta.* no. 568, 16 pp., 17 refs. New Brunswick, N.J., April 1934. [Recd. April 1935.]

This is a review of the literature since 1928 on experiments on the effect of radio waves on several species of insects and their food-plants. Most of the papers referred to have been noticed [*R.A.E.*, A **19** 528 ; **21** 327, etc.]. Since insects are so much more sensitive to radio waves than are plants [*cf.* **19** 486], insects may often be destroyed and plants left unharmed by the same treatment. Most substances [*cf.* **19** 528] in which insects feed have little or no protective effect against the lines of force in the electrostatic field, but substances carrying a considerable amount of distributed water, such as soil or sawdust, heat so rapidly that lethal temperatures are reached in the material about as quickly as in the insect body. If this occurs, the differential between plant and animal tissue may be lost.

Phillips (J. S.). **The Biology and Distribution of Ants in Hawaiian Pineapple Fields.**—*Bull. Exp. Sta. Pineapple Prod. Ass. Univ. Hawaii* no. 15, iii + 57 pp., 4 figs., 61 refs. Honolulu, August 1934. [Recd. April 1935.]

This paper, which begins with a key to the species of ants in the Hawaiian Islands and a chart showing their distribution, contains notes on the bionomics of 11 species (of which *Pheidole megacephala*, F., and *Solenopsis geminata rufa*, Jerd., are dealt with in some detail),

the climatic factors affecting the distribution of ants, and some observations on the ways in which ants modify and are limited by their environment. The relations of ants to injurious and beneficial insects and to plants are outlined, with reference to the literature [*cf. R.A.E.*, A **19** 676; **20** 607]. They often destroy Dipterous and Hymenopterous parasites; the author has observed that *Scolia manilae*, Ashm., which was introduced into Hawaii against *Anomala* [*orientalis*, Waterh.] [**5** 426] and which also parasitises the larvae of *Adoretus sinicus*, Burm., is attacked by *Pheidole* after heavy rain. Ants are important enemies of termites.

PHILIPP (W.). **Erdbeerschädlinge.** [Strawberry Pests.]—*Kranke Pflanze* **12** no. 5 pp. 73–77, 1 pl. Dresden, May 1935.

An account is given of the bionomics of the raspberry weevil, *Anthonomus rubi*, Hbst., attacking strawberries in Saxony. A pyrethrum or derris dust may be used against the adults, but the only way to get complete control is to collect all flowers and buds infested by the larvae. As the young adults feed before hibernation on the leaves of strawberry, raspberry and blackberry, an arsenical spray can be applied after the crop has been picked and again about three weeks later.

MULLER (K. R.). **Zur Bekämpfung des Getreidelaufkäfers.** [On the Control of *Zabrus tenebrioides*.]—*Kranke Pflanze* **12** no. 5 pp. 77–79, 1 pl. Dresden, May 1935.

The following method has given good results in Saxony against *Zabrus tenebrioides*, Goeze, when infestation of rye, wheat or barley has begun at the edges of the field. The plants are ploughed under up to the most advanced point at which larvae occur. Deprived of their food, the larvae at once begin to migrate to standing plants and are trapped in holes at the bottom of a trench with steep sides.

GINSBURG (J. M.), SCHMITT (J. B.) & GRANETT (P.). **Derris Insecticides. I. Toxicity of Various Extracts of Derris Root to Sucking and Chewing Insects.**

GINSBURG (J. M.) & GRANETT (P.). **II. Insecticidal Properties of Extracted Derris Root Residue.**—*Bull. N.J. agric. Exp. Sta.* no. 576, 23 pp., 32 refs. New Brunswick, N.J., April 1934. [Recd. April 1935.]

GINSBURG (J. M.) & GRANETT (P.). **III. Aphicidal Properties of Derris and Cube Root.**—*Op. cit.* no. 581, 12 pp., 6 refs. February 1935.

The first two papers have been noticed from abstracts [*R.A.E.*, A **22** 407, 403].

The following is substantially the authors' summary of the third paper. Extracts, dusts and suspensions in water of derris root were tested on several species of Aphids infesting various plants, and the sprays were also similarly tested in combination with other insecticides or fungicides. When derris was combined with lead arsenate alone, or with lead arsenate together with hydrated lime and sulphur, singly or together, its toxicity was reduced by from 10 to 40 per cent., but this deficiency was made up by adding wetting agents in sufficient quantities to the extract or to the suspension sprays. Similar reductions in toxicity that resulted when liquid lime-sulphur was combined

with derris were corrected in the suspension sprays by adding a sufficient quantity of wetting agent. In the extracts, a reduction of about 15–20 per cent. in toxicity was observed even when a wetting agent was used. It was concluded from tests comparing samples of derris root containing from 0 to 9 per cent. rotenone, that the toxicity of derris is not always directly proportional to its rotenone content, especially in samples containing a high percentage of rotenone. When efficient wetting agents are used, from 0·5 to 1 lb. derris root, containing about 5 per cent. rotenone and 18 per cent. acetone extractives, or from 0·25 to 0·5 U.S. pint commercial acetone extract, containing about 5 per cent. rotenone and 16 per cent. extractives, are required per 100 U.S. gals. spray to obtain a 90 per cent. kill or more. The rate of kill was considerably slower when derris was applied as a dust than when it was used as an extract or suspension in water. A comparison of samples of cubé [*Lonchocarpus*] and derris roots containing about the same amounts of rotenone and total extractives showed that they were about equally toxic to Aphids.

NAUDE (T. J.). **Termites in Relation to Veld Destruction and Erosion.**—*Bull. Dep. Agric. S. Afr.* no. 134, 20 pp., 14 figs. Pretoria, 1934. [Recd. April 1935.]

Destruction of the veldt by termites has become increasingly common during the last 5–6 years and is reported from the Transvaal, Bechuanaland and South West Africa in addition to the Orange Free State, to which it was at first almost entirely confined. It is due chiefly to harvester termites, of which there are 8 species in South Africa, *viz*, *Hodotermes* (*Macrohodotermes*) *mossambicus*, Hag., *H.* (*M.*) *karrooensis*, Fuller, *H.* (*M.*) *pallidus*, Fuller, *H. viator*, Latr., *H. thomseni*, Fuller, *H. faurei*, Fuller, *H. silvestrii*, Fuller, and *H. peringueyi*, Fuller. They gather large quantities of grass and some of the fine-stemmed herbs and shrubs into their nests. It is probable that the general overstocking of the land and the loss in carrying capacity due to increased agricultural activities as well as the effect of severe drought have served to accentuate the damage. The drought in itself may have favoured the establishment of new nests, however, by producing suitably dry conditions in the upper layers of soil for the establishment of new royal pairs. The termites tend to concentrate around already denuded patches rather than to establish new centres of infestation in thick, high grass. Predatory birds and other natural enemies are rare. In 1933 these termites were taking the entire crop that remained after grazing as well as all the new spring growth. In many cases the stubble seemed to have died, particularly on friable black turf. By June 1934, after good rains, the grass had recovered but the destruction of perennials had resulted in the predominance of annuals.

Mound-building termites, particularly *Eutermes* (*Trinervitermes*) *havilandi*, Fuller, are also of common occurrence on the veldt, and cause great loss in grazing land. *Cubitermes* (*Termes*) *bilobatus*, Hav., lives in close association with *Eutermes* and often in the same mound. This species is reported to live largely on fresh dung and not to feed on grass, but it is abundant in Pretoria in places where no old or fresh animal excreta exist.

Fungus growers of the genus *Termes* are also implicated in the destruction of grass lands. The young subsist on the fungus gardens and the

workers on dead wood, which they dispense to the other adults of the termitary as regurgitated or voided food. *Termes latericius*, Hav., and *T. badius*, Hav., also damage lawns. In the veldt, plaster covers are constructed round all pieces of waste wood and small tufts or patches of grass roots, and their remarkable abundance in 1933 indicated the largeness of the population and the annual loss that probably occurs unobserved under the cover of a normal grass carpet. During such periods of drought, in the absence of abundant decaying grass (which is probably their staple cellulose food), these termites may cause considerable damage by the destruction of grass roots and stubble where no other form of cellulose such as wood is available. They are often found in association with *Hodotermes*. Excreta of farm animals may be worked through infested soil. Dry maize stalks are destroyed on a large scale in some areas. During a journey covering over 500 miles of heavily infested soil in the northern and central Orange Free State only 6 typical nests of *T. latericius* were observed. The author considers that this absence of typical earthworks is less likely to be due to a very recent expansion in infestation than to the effect of local soil conditions on the structure of the nests.

The extreme denudation caused by termites, both with and without the assistance of drought, probably has a considerable bearing on erosion and, especially in the case of harvester termites, on the loss of storm water. The fungus growers may be controlled by arsenic and sulphur fumes, or by pouring petrol into any medium sized tunnel above the nest. Poison baits seem to check the damage done by harvesters.

BREDO (H. J.). **Catalogue des principaux insectes et nématodes parasites des caféiers dans les Uelés.**—*Bull. agric. Congo belge* **25** no. 4 pp. 494–514, 12 figs. Brussels, December 1934. [Recd. May 1935.]

The following insects are recorded as infesting coffee in the north eastern part of the Belgian Congo, and notes are given on their bionomics and control, chiefly based on observations in other parts of the world: *Ferrisiana virgata*, Ckll., *Icerya nigroareolata*, Newst., *Cephonodes hylas*, L., *Leucoptera coffeella*, Guér., an unidentified leaf-rolling moth, and *Epicampoptera marantica*, Tams, which attacked the leaves; *Stephanoderes hampei*, Ferr., *Antestia lineaticollis*, Stål, *A. faceta*, Germ., and *Ceratitis* (*Trihrithrum*) *inscripta*, Grah., which injured the fruit; *Saissetia nigra*, Nietn., *Coccus* (*Lecanium*) *viridis*, Green, and *Ceroplastes* sp., which occurred on the shoots; and *Bixadus sierricola*, White, *Apate monacha*, F., *Tragocephala pulchra*, Jord., and *Anthores leuconotus*, Pasc., which bored in the stems.

STEYAERT (R. L.). **Note concernant la maladie du chancre des tiges du cotonnier produite par l'***Helopeltis bergrothi*.—*Bull. agric. Congo belge* **25** no. 4 pp. 603–608. Brussels, December 1934. [Recd. May 1935.]

In view of criticisms of the author's conclusion that " shoot canker " of cotton in the Belgian Congo is not a fungus or bacterial disease but the result of the feeding of *Helopeltis* spp. [*R.A.E.*, A **23** 99], he quotes extensively from a paper on the relation of a Capsid of this genus to the stem canker of tea in Nyasaland [**21** 153], which supports his view.

Anderson (T. J.). **Entomological Section.**—*Rep. Dep. Agric. Kenya 1933* pp. 137–145. Nairobi, 1934. [Recd. May 1935.]

According to [H. C.] James, mealybugs were not of great importance on coffee in Kenya during 1933 owing to the prevailing climatic conditions. Predators caused some mortality at times, but were less effective than had been expected. Indigenous parasites are scarce and probably ineffective. *Pseudococcus lilacinus*, Ckll., is still confined to the coffee areas of the Central Province, where it is recorded from about 80 plants including the chief field and garden crops. *P. citri*, Risso, is distributed throughout most of the coffee-growing areas and is of minor economic importance, though the root-infesting form [*cf. R.A.E.*, A **21** 629] causes the foliage to turn yellow and may kill the tree when it occurs in association with a fungus [*cf.* **22** 227]. The incidence of this form in Kenya appears to be related to excessive dampness of the soil.

[R. H.] Le Pelley quotes extracts of a paper by James on *Asterolecanium coffeae*, Newst., on coffee [**21** 628] and states that severe attacks of *Antestia* occurred in several districts. *Lygus simonyi*, Reut., was of minor importance owing to the flowering of coffee during two main periods and the consequent lack of intermittent flowering [*cf.* **20** 338].

Natural enemies of *Epicampoptera* (*Metadrepana*) *andersoni*, Tams, recorded by [F. B.] Notley include the Tachinids, *Sturmia inconspicua*, Mg., and *Tricholyga sorbillans*, Wied., the Ichneumonids, *Hemipimpla pulcher*, Morley, and *Xanthopimpla maculosa*, Tosq., the Chalcidid, *Brachymeria bottegi*, Masi, and the Pentatomid, *Glypsus vigil*, Germ. Capsids recorded from coffee include *Deraeocoris ostentans*, Stål, *Lygus vosseleri*, Popp., *L. simonyi*, Reut., and *Volumnus obscurus*, Popp. *Phloeobius pustulosus*, Gerst., caused some damage to coffee for the first time since 1929, and *P. crenellatus*, was recorded from this crop for the first time in the country.

Strong (L. A.). **Report of the Chief of the Bureau of Entomology, 1934.**—20 pp. Washington, D.C., U.S. Dep. Agric., 1934.

During the year ending 30th June 1934, the occurrence of remarkably low temperatures did not appear to affect the larvae of *Aserica* (*Autoserica*) *castanea*, Arrow, which continued to spread and was found for the first time in northern and central New Jersey, or of the Japanese beetle [*Popillia japonica*, Newm.] [*cf. R.A.E.*, A **23** 320]. Importations of parasites included 6,165 puparia of the Tachinid, *Centeter cinerea*, Aldr., and 28,380 cocoons of *Tiphia vernalis*, Rohw., against *Popillia*, 5,066 cocoons of *Tiphia* sp. against *Aserica* and 2,909 females of another species of *Tiphia* against *Serica* [*similis*, Lewis], all from the Far East [*cf.* **22** 73]; and *Tetrastichus* sp. from Japan against the elm leaf beetle [*Galerucella luteola*, Müll.]. Exportations of parasites included *Trichogramma minutum*, Riley, to Canada, *Macrocentrus ancylivorus*, Rohw., to Italy and Japan, *M. delicatus*, Cress., to Italy, and *Glypta rufiscutellaris*, Cress., and *Pristomerus ocellatus*, Cushm., to Japan, all against the oriental fruit moth [*Cydia molesta*, Busck]; *Microbracon brevicornis*, Wesm., to Mexico against the pink bollworm [*Platyedra gossypiella*, Saund.]; *Ascogaster carpocapsae*, Vier., to Canada and *Phanerotoma tibialis*, Hald., to New Zealand against the codling moth [*Cydia pomonella*, L.]; and *Aphelinus mali*, Hald., to Colombia and Costa Rica against the woolly apple aphis [*Eriosoma lanigerum*, Hsm.].

Infestation of cotton by the boll weevil [*Anthonomus grandis*, Boh.] was heaviest in Louisiana, Mississippi and southern Arkansas. In dusting experiments in South Carolina equal proportions of hydrated lime and calcium arsenate at the rate of 8 lb. per acre gave as good results as calcium arsenate alone at 7 lb. per acre. The results were not unsatisfactory when the proportion of hydrated lime was doubled and the rate was increased to 9 lb. per acre. This mixture would be cheaper and would lessen the danger of arsenical injury to the soil and of infestations by Aphids that often follow heavy applications of calcium arsenate. In an experiment in Louisiana to determine the effect of dusts of calcium arsenate on succeeding crops, a plot treated for three successive years with 400 lb. of the arsenical per acre yielded 1,501 lb. seed cotton per acre in the third year and the controls 1,459 lb. *Microbracon mellitor*, Say, was the most abundant parasite reared at the different stations. *Eurytoma tylodermatis*, Ashm., and *Catolaccus hunteri*, Cwfd., were next in importance. A total of 25,000 adults of *M. brevicornis* were liberated in 1933 against *P. gossypiella* in Mexico and in Texas, where over 3,000 of *Pimpla* (*Exeristes*) *roborator*, F., were also released in September and October. The cutting and burning of practically all *Croton* plants [*cf.* **21** 655] over 10,000 acres in Texas during the winter resulted in a reduction of the population of cotton fleahoppers [*Psallus seriatus*, Reut.] during the following April–May but a large influx occurred from outside areas at the end of May when the cotton began to fruit.

Unusually hot weather at the end of May after cold and dry weather in early spring caused large numbers of grasshoppers to hatch. They immediately moved into cultivated crops, where they were for the most part controlled by the repeated use of baits. The success of oil baits [*cf.* **22** 277] apparently depends partly on the absence of sulphur compounds from the oil. Outbreaks of the mormon cricket [*Anabrus simplex*, Hald.] were more widely distributed than in the preceding year. In one area arsenical dusts applied over about 10,000 acres against migrating bands reduced but did not eradicate infestation, and further trouble is expected in spring 1935. The first brood of chinch bugs [*Blissus leucopterus*, Say] injured small grains and in many places began to migrate to maize early in June. The distribution of over 6,000,000 U.S gals. creosote prevented severe general damage and demonstrated the effectiveness of barriers [*cf.* **23** 53 ; etc.] when infestation is heavy. In the spring of 1933 *Euetheola rugiceps*, Lec., caused an estimated loss of at least 25,000 tons of sugar-cane in Louisiana. *Carolinaia* (*Aphis*) *setariae*, Thos. (*bituberculata*, Wils.) has been found to transmit sugar-cane mosaic.

White grubs (*Lachnosterna*) have been becoming increasingly injurious during recent years, and serious damage to pastures and cultivated crops has been reported over wide areas in Wisconsin, Minnesota and Iowa. *Otiorrhynchus* (*Brachyrrhinus*) *ligustici*, L., caused injury to the roots of lucerne over an area of at least 60 sq. miles in New York [*cf.* **21** 476].

It seems probable that the Tachinid [*Paradexodes epilachnae*, Ald.], which was introduced from Mexico against the Mexican bean beetle [*Epilachna corrupta*, Muls.] [**20** 216], and has again been liberated but not recovered, is unable to survive the winter without an alternate host. Owing to unprecedented weather conditions, the pea Aphid [*Macrosiphum onobrychis*, Boy.] caused considerable damage in the northern and particularly the north-western pea-growing areas.

Large numbers of overwintered pea Bruchids [*Bruchus pisorum*, L.] may be concentrated upon the flowers of plants in border strips planted 3 or 4 weeks before the main crop. When heavily infested strips were ploughed under to a depth of 8–9 ins. and the ground was then treated three times with a harrow and cultipacker, only 1·7 per cent. of the population survived. It has been demonstrated that crop rotation, the planting of uninfested material, and the cleaning up of fields at harvest and of old storage banks will reduce infestation by the sweet potato weevil [*Cylas formicarius*, F.], and if continued systematically, will eradicate it from any given farm. Further work on the control of the sand wireworm [*Horistonotus uhleri*, Horn] showed that the starvation method [**22** 355] is of no value. Damage to *Capsicum* by the pepper weevil [*Anthonomus eugenii*, Cano] has been reduced in several areas by the destruction of nightshade [*Solanum nigrum*], the chief winter food-plant.

Macrocentrus ancylivorus, which is now considered the most abundant and effective parasite of *Cydia* (*Grapholitha*) *molesta*, is the dominant species in many districts and is practically always associated with a pronounced reduction in infestation of peaches. Work in Mexico with baits for fruit-flies has shown that proteins decomposed by strong alkali or by suitable micro-organisms give products especially attractive to the guava fruit-fly [*Anastrepha striata*, Schin.]. Tests in mango and *Citrus* orchards showed that, even under the conditions of general infestation by the Mediterranean fruit-fly [*Ceratitis capitata*, Wied.] that exist in Hawaii, considerable protection can be obtained by repeated applications of sweetened bait-sprays containing poisons such as tartar emetic or potassium antimony tartrate. *A. acidusa*, Wlk., and *A. suspensa*, Lw., have nearly disappeared from Key West [*cf.* **22** 325], and work has been transferred to Porto Rico, where both species are present; the latter has been found to infest *Citrus* in the field.

Felt (E. P.). **A new Melon Gall Midge.**—*Bull. Brooklyn ent. Soc.* **30** no. 2 pp. 79–80. Lancaster, Pa, April 1935.

A description is given of both sexes of *Itonida citrulli*, sp. n., which was reared each year during 1932–34 at Tucson, Arizona, where it is a serious pest of watermelons (*Citrullus vulgaris*). The larvae cause the tips of the vines to curl and die.

Kadow (K. J.) & Shropshire (L. H.). **Tomato Diseases and Insect Pests.**—*Circ. Illinois agric. Exp. Sta.* no. 428, 36 pp., 13 figs. Urbana, Ill., February 1935.

Brief notes are included on the bionomics and control of the major insect pests of tomatos in the field and the greenhouse in Illinois, together with instructions for sterilisation of the beds and the use of insecticides.

Hadley (C. H.) & Hawley (I. M.). **General Information about the Japanese Beetle in the United States.**—*Circ. U.S. Dep. Agric.* no. 332, 22 pp., 1 pl., 15 figs., 5 refs. Washington, D.C., December 1934. [Recd. May 1935.]

This circular on *Popillia japonica*, Newm., contains less detailed but similar information to that given in a previous one [*R.A.E.*, A **14** 428], which it supersedes. The discussion of parasites is limited to *Tiphia*

popilliavora, Rohw. [*cf.* **22** 415] and *T. vernalis*, Rohw. [*cf.* **22** 412], the two introduced species that have become established, and recommendations for artificial control are omitted.

MERRILL (R. M.). **Use of Farm Machinery for Corn-borer Control in the One-Generation Area.**—*Circ. U.S. Dep. Agric.* no. 321, 10 pp., 10 figs., 2 refs. Washington, D.C., November 1934. [Recd. May 1935.]

The one-generation strain of the European corn borer [*Pyrausta nubilalis*, Hb.] occurs in Pennsylvania, New York and Ohio and certain areas in Michigan, Indiana, Wisconsin, West Virginia and Kentucky. The measures recommended for destroying the larvae in maize fields after harvest consist in ploughing, shaving and raking, or cutting the stalks at ground level. Suitable equipment is discussed [*cf. R.A.E.*, A **23** 198, etc.].

WATSON (J. R.) & others. **Entomology.**—*Rep. Florida agric. Exp. Sta. 1933–34* pp. 51–56, 84–85. Gainesville, Fla. [1935.]

Many of the pests observed in Florida during the year ending 30th June 1934 have been noticed from previous reports [*cf. R.A.E.*, A **22** 693, etc.]. The Coccid, *Margarodes* sp., was found in certain localities on the roots of *Citrus* and other plants. Oviposition begins in April and reaches its height in early May, and the larvae, on hatching, attach themselves to the roots of the food-plant. They are destroyed by ants. *Calotermes* (*Neotermes*) *castaneus*, Burm., may enter a tree through an old wound where the wood has started to decay. Tests carried out over a period of 11 months showed that it could live on seasoned oak, pine and cypress wood, but died if there was very little moisture present. *Frankliniella williamsi*, Hood, was found infesting maize and sugar-cane. Recoveries were made of *Tanaomastix* (*Paraleptomastix*) [*abnormis*, Gir.], a parasite of mealybugs that was introduced several years ago [*cf.* **12** 493]. The percentages of *Nezara viridula*, L., parasitised by *Trichopoda pennipes*, F., and other Tachinids were 25–85 during July–November, the parasites increasing more rapidly than the bugs.

Investigations on *Empoasca fabae*, Harr., showed that the average number of adults on a bean plant ranged from 5·5 to 7·3 on the various varieties, and the average number of nymphs from 11·1 to 12·7. A new type of dust, which consisted of mixtures of pyrethrum flowers (0·9 per cent. pyrethrins I and II), pyrethrum dust A (0·5 per cent. pyrethrins I and II), or pyrethrum dust D (0·05–0·08 per cent. pyrethrins I and II), and sulphur in 6 different combinations gave almost complete control of *E. fabae* on test plots [*cf.* **23** 282]. Each of the first two pyrethrum powders were combined with sulphur in the ratios of 1 : 19 and 1 : 9, and dust D in the ratios of 1 : 3 and 1 : 1. Although the beans began to show reinfestation after 5 or 6 days in each case, the number of Jassids on the treated plots was far below that on the controls. Four different combinations of pyrethrum and sulphur were tested in the field, and the results compared favourably with those obtained in the test plots. During these experiments a large part of a plot of beans was destroyed by *Elasmopalpus lignosellus*, Zell. (lesser corn-stalk borer).

Infestation of *Citrus* by *Aphis spiraecola*, Patch, was light because of unfavourable weather and the attacks of predators and parasites.

Among these *Baccha clavata*, F., *B. lugens*, Lw., and *Cycloneda sanguinea*, L., were found whenever Aphids were present ; *Leucopis americana*, Mall., *Olla* (*Coccinella*) *oculata*, F., and *Lysiphlebus testaceipes*, Cress., were present much of the time ; and *Syrphus wiedemanni*, Johns., and *Chilocorus stigma*, Say (*bivulnerus*, Muls.) were found only in the winter. During June the fungus, *Empusa fresenii*, destroyed more than 25 per cent. of the Aphid population. A spray containing 50 per cent. white oil and 0·33 per cent. rotenone gave good control. Aphids recorded in Florida for the first time were *Calaphis castaneae*, Fitch, *Aphis nyctalis*, Hottes & Frison, and *Pterocomma* (*Clavigerus*) *smithiae*, Monell, taken on *Castanea pumila*, *Senecio glabellus* and willow, respectively. During the year *Taeniothrips gladioli*, Mlt. & Stnw. (gladiolus thrips) spread to nearly all counties of the State. Thirteen complete generations have been reared in the laboratory from August 1933 to June 1934. The egg stage lasted 5·9 days, and the adult stage was reached 11 days later. The males lived for 35·7 days and the females for 30·7.

In experiments on the control of *Lepidosaphes beckii*, Newm. (purple scale) and rust mites [*Phyllocoptes oleivorus*, Ashm.] on *Citrus*, a mixture of 5 lb. dry lime-sulphur and 2 lb. colloidal sulphur in 100 U.S. gals. water gave better results than sprays of either dry or liquid lime-sulphur alone. On plots that received sulphur dust or colloidal sulphur alone the numbers of *L. beckii* increased. Of various sprays, liquid lime-sulphur (1 : 50) with wettable sulphur 5 lb. per 100 U.S. gals. water gave the best results as a combined spray against scale and rust mites. Dry lime-sulphur (5 lb. per 100 U.S. gals.), and liquid lime-sulphur (1 : 40) alone or with 5 lb. hydrated lime per 100 U.S. gals., reduced scale and Aleurodids. When 3 applications of lime-sulphur (1 : 40) and lime-sulphur (1 : 40) mixed with 4 lb. colloidal sulphur were made at fortnightly intervals, a marked reduction in the numbers of living scales per leaf was still noticeable 9 months after the last application. Of 2 plots sprayed with colloidal sulphur, scale increased on one and decreased on the other.

Eddy (C. O.), Valleau (W. D.) & Magill (W. W.). **The Control of Fruit Pests.**—*Bull. Kentucky agric. Exp. Sta.* no. 353 pp. 205–239. Lexington, Ky, October 1934. [Recd. May 1935.]

General information is given on the usual pests of orchard trees and small fruits in Kentucky, together with instructions for the use of insecticides for their control.

Hixson (E.). **The more important Insect Pests during 1932–34.**—*Rep. Okla. agric. Exp. Sta. 1932–34* pp. 256–259. Stillwater, Okla. [1935.]

Among pests of cotton in Oklahoma, *Anthonomus grandis*, Boh., was kept in check by dry weather ; *Heliothis obsoleta*, F., was more prevalent on maize than on cotton ; and *Aphis gossypii*, Glov., caused serious injury when the crop was grown near cowpeas or okra [*Hibiscus esculentus*]. Serious damage was done by *Cydia* (*Carpocapsa*) *pomonella*, L., to apples in 1933 ; by *Cinara* (*Lachnus*) *tujafilina*, Del G., to arborvitae [*Thuja occidentalis*] in 1934 ; and by *Toxoptera graminum*, Rond., to wheat in 1934.

WHITEHEAD (F. E.). **Two Species of Pecan Phylloxerae identified.**—*Rep. Okla. agric. Exp. Sta. 1932–34* pp. 260–264, 2 figs. Stillwater, Okla. [1935.]

In the course of further work on pecan Aphids in Oklahoma [*cf. R.A.E.*, A **21** 509] it has been found that *Phylloxera caryaecaulis*, Fitch, hibernates as an egg enclosed within the dead body of a female of the previous season. These eggs hatch in April, and the resulting wingless, parthenogenetic females, when mature, deposit about 600 eggs in the galls formed by their feeding on twigs and blossoms. The young hatch in 6–7 days and give rise to winged adults. At this time the gall is dry and cracked, and the winged Aphids emerge. They oviposit near the galls, and their offspring are sexual forms. After pairing, the females crawl to a protected place usually under the bark, where they die after the formation of a single, fertilised egg within their bodies. *P. notabilis*, Perg., also overwinters as an egg, but it is not encased in the parent's body. These eggs hatch in May and produce parthenogenetic females, which deposit eggs in the galls on the leaves. Two forms are produced from these eggs, one alate and the other with vestigial wings. The latter deposits eggs on leaves and twigs and in the galls if they are not yet open. Males and females are produced from these eggs, and after pairing the female crawls under the bark and dies after laying one egg. The winged adults usually fly to other branches of the same tree or to other trees, where they oviposit. Their eggs give rise to another generation, which produces galls if developing leaves are available. The summers of 1933 and 1934 were so hot and dry that there was not sufficient growth for the development of this generation and the forms it gives rise to are not known. These Aphids are not so harmful as was at first thought. *P. caryaecaulis* seems to be limited to a few susceptible trees, and attempts to transfer it to other trees have failed. *P. notabilis* is even less destructive. Less than 0·1 per cent. of the trees examined were badly infested and even these bore fair crops. Trees that had been heavily infested for 4 or 5 years were free from infestation in 1934 and may have become resistant.

BIEBERDORF (G. A.). **The Clover Leaf Weevil.**—*Rep. Okla. agric. Exp. Sta. 1932–34* pp. 268–269. Stillwater, Okla. [1935.]

Lucerne is the principal food-plant of *Hypera punctata*, F. (clover leaf weevil) in Oklahoma, where it has not been taken on clover. It has only one generation a year. In 1932 and 1933 oviposition began about mid-October. The eggs hatched in 9 days under laboratory conditions, and the larvae overwintered. As newly-hatched larvae were found from March to May 1933, the insect also hibernates in the egg stage. The largest numbers of larvae were found in March and April. The earliest pupae were observed on 20th March 1934, and the first adults emerged on 3rd April. Adults were found throughout the rest of the growing season, but were most numerous in April, May and June at the bases of the plants. After feeding for a time they became inactive and gregarious during the early summer, but resumed feeding in September. Dusting with 14 lb. calcium arsenate per acre gave slightly better control and was cheaper than cryolite dust. Hay from the plots dusted with calcium arsenate did not harm livestock.

Dahms (R. G.). **Deep Burial kills Chinch Bugs.**—*Rep. Okla. agric. Exp. Sta. 1932–34* p. 269. Stillwater, Okla. [1935.]

In studies on *Blissus leucopterus*, Say, burial in the soil at a depth of 5 ins. (but not less) gave complete control. The percentage of adults that survived the winter of 1933–34 at Stillwater (Oklahoma), when a minimum temperature of 10°F. was recorded, was 79·4. They emerged from hibernation between 9th and 22nd April. There appeared to be 3 generations a year, some adults of the second and all of the third hibernating.

Hixson (F.). **Hand Picking as a Control for the Squash-bug.**—*Rep. Okla. agric. Exp. Sta. 1932–34* pp. 269–271. Stillwater, Okla. [1935.]

In tests in Oklahoma during 1934 it was found that collecting the eggs of *Anasa tristis*, DeG., by hand was effective if it was repeated frequently over a long period. The first bugs came out of hibernation on 6th May but were not found on the squash plants until 25th May. The first eggs were found on 30th May, and a few nymphs appeared for the first time on 12th June. The number of adults collected varied greatly from day to day, but the largest numbers were found on the 18th and 27th June and the 6th July. The data indicated that emergence from hibernation probably continues over a long time, and that there may be constant migration from field to field as well. In experiments with insecticides dusts and sprays of pyrethrum, derris and nicotine were ineffective. Calcium cyanide dust applied as a fumigant under a cover placed over a squash vine killed all stages except the eggs.

Hixson (E.). **Boll Weevil Control Results for 1933–34.**—*Rep. Okla. agric. Exp. Sta. 1932–34* pp. 271–274. Stillwater, Okla. [1935.]

During 1933 and 1934, studies of *Anthonomus grandis*, Boh., were continued in Oklahoma [*cf. R.A.E.*, A **21** 509]. The comparatively small numbers of overwintering adults and the hot, dry weather in 1933 kept infestation low. In 1934 the peak of emergence varied from 25th May to 20th June, but one field contained 720 weevils per acre as early as 18th May. During May and June, there was an unusually large weevil population, but the hot, dry summer reduced infestation to about 10 per cent. in most fields. Experiments indicated that in average years the bolls are susceptible to injury by the weevil for a period of 45 days and that most of the bolls on early cotton are set when the adults of the new generation appear. Of parasites reared in 1933, *Microbracon mellitor*, Say, was more abundant than *Catolaccus hunteri*, Cwfd. All parasites were scarce early in the season. The direction in which rows of cotton are planted appears to have little effect on the numbers of weevils killed by heat.

[**Spraying Problems.**]—*Proc. N.Y. St. hort. Soc.* **80.** Le Roy, N.Y. 1935.

The papers read included the following dealing with questions relating to the spraying of fruit trees in New York State :—Spray Service Problems in 1934 and 1935, by C. R. Crosby (pp. 7–15) ; Spray Problems : In Retrospect and Prospect, by P. J. Parrott (pp. 25–33) ; The Role of Arsenicals in the Hudson Valley Spray Program for Apples,

by P. J. Chapman (pp. 180–185) ; Spray Injury and Spray Practices to avoid it, by J. M. Hamilton (pp. 185–190). In another paper, The Spray Residue Problem of Currants, by P. J. Chapman and G. W. Pearce (pp. 250–266, 2 pls.), it is pointed out that this problem chiefly arises when currants are grown under fruit trees so that spray drips or is blown on to them. Experiments on the removal of lead arsenate residues from currants by washing them in dilute hydrochloric acid and then rinsing off the acid with water, are described. The red colouring matter in the currants is soluble in the acid, but not sufficiently so to be affected by the treatments tested. If the berries are cracked and in poor condition, some juice may be lost, but this is compensated for by the water (about 2 per cent.) taken up in the washing. In the laboratory, samples were uninjured after washing in hydrochloric acid at strengths up to 5 per cent. for 3 mins. at 72°F. followed by a rinsing in water. The berries cracked and lost a large amount of juice when placed in 1·5 per cent. acid for 1 to 3 mins. at 142°F., and slight injury occurred at 108°F. with 3 mins. exposure to the acid. In commercial washing tests currants were placed in 1–2 per cent. hydrochloric acid solutions for 2–3 mins. at temperatures varying between 55 and 72°F. Washing with 1 per cent. hydrochloric acid for 3–4 mins. at 60°F. reduced the residue from 0·012 to 0·002 gr. lead per lb. and from 0·030 to 0·002 gr. arsenic per lb. It was found that jelly made from crushed berries which before washing had 3 times more arsenic and 5 times more lead than the tolerance contained considerably less arsenic and lead than the tolerance allows. A total of 35–50 per cent. of the residue was removed when the fruit was washed before making the jelly, and another 30–50 per cent. was removed with the stems, pulp, etc., after the juice was extracted. More spray residue is removed if the fruit is heated before it is extracted. About 25 per cent. of the total spray residue is found on the stems of the currants, and when these are removed, fruit bearing 2 and 3 times the amount of lead and arsenic tolerated can be cleaned effectively. The residue problem can be avoided by planting currant bushes by themselves or by using substitutes for lead arsenate. Among the chief pests of currants, the San José scale [*Aspidiotus perniciosus*, Comst.] can be controlled by a dormant application of lime-sulphur (1 : 8) or possibly by a 2–3 per cent. lubricating oil emulsion, and the currant aphis [*Capitophorus ribis*, L.] by a nicotine spray or dust treatment. The use of lead or calcium arsenates has been almost entirely restricted to the control of the imported currant worm [*Pteronus ribesii*, Scop.].

De Leon (D.). **A Study of** *Medetera aldrichii* **Wh. (Diptera-Dolichopodidae), a Predator of the Mountain Pine Beetle** (*Dendroctonus monticolae* **Hopk., Coleo.-Scolytidae**).—*Ent. amer.* **15** N.S. no. 2 pp. 59–90, 4 pls., 3 pp. refs. Lancaster, Pa, April 1935.

All stages of *Medetera aldrichi*, Wheeler, are described, and a table gives a list of the conifers in which larvae of the genus *Medetera* were found in galleries of bark-beetles in Montana, Idaho, Washington and California. The larvae of *M. aldrichi*, which hatch in 10–14 days, work their way into the inner bark of pines and feed chiefly on the immature stages of *Dendroctonus monticolae*, Hopk., of which they are the commonest and most important predator in Montana, Idaho and eastern Washington. Apparently they do not feed continuously on the first larva that they attack but move from host to host. They are present

throughout the year and can live for nearly a month in decaying cambium. They were most numerous in trees recently infested by *Dendroctonus*, since they prefer moist conditions, but they were also discovered in trees in all stages of infestation by the bark-beetle, and in some that had been recently abandoned. The small larvae usually live between the wood and the bark, but the larger ones are often equally numerous in the soft inner bark, where they are entirely concealed. They probably destroy about 40–50 per cent. of the brood of the host. The larvae live 1–11 months and then construct cocoons, usually in cells in the soft inner bark, where they undergo a pupal period of 14–17 days during May–September.

Adults were found on various trees, but were most numerous on infested pines that had recently been attacked. The eggs, which are laid singly or in clusters of 2–3 under loose bark scales or in small crevices, have not been seen on green trees. One female contained 65 eggs.

Control measures in use against *Dendroctonus* in spring or early autumn are removing the bark from infested logs to expose the larvae or pupae to the weather and to natural enemies [*cf. R.A.E.*, A **23** 51] and burning infested logs. Both result in the destruction of *Medetera*, but treatment in early autumn, particularly in the case of lodgepole pine (*Pinus contorta*) is recommended, since it destroys fewer of the chief parasite, *Coeloides dendroctoni*, Cush. [*cf.* **22** 691] than treatment in the spring. Although the Braconid only attacks about 16 per cent. of the brood, it is probably a more important factor in control than *Medetera*, since it attacks the mature larvae, whereas the fly usually attacks only the younger ones, which might in any case have succumbed to other causes. Neither *Medetera* nor *Coeloides* can, however, prevent outbreaks of *Dendroctonus*.

Diseases, Insects and other Pests injurious to Plants.—*Bienn. Rep. Kans. agric. Exp. Sta.* **7** (1932–34) pp. 94–112. Manhattan, Kans., December 1934. [Recd. May 1935.]

Information, some of which has been previously noticed [*R.A.E.*, A **22** 353, 646 ; **23** 359], is given on work carried out in Kansas during 1932–34. Data are discussed on the factors influencing the attraction of insects to light traps, the influence of high temperatures on insects situated on the ground and on their food-plants, with particular reference to lucerne, and the resistance of different varieties of *Sorghum* to the chinch bug [*Blissus leucopterus*, Say], of wheat to the Hessian fly [*Mayetiola destructor*, Say] and of lucerne to the pea aphis [*Macrosiphum onobrychis*, Boy.]. Insects attacking wheat included the wheat straw-worm [*Harmolita grandis*, Riley]. In the insectary the adults of the first generation lived for 10 days, and the egg stage lasted 10–11, the first larval instar 6–10, the second 4–6, the third 17–22 and the pupal stage 14–16, during February–May 1932. Spring wheat was about equally infested in 1932 and 1933. Chinch bugs [*Blissus leucopterus*, Say] were numerous in the summers of 1933 and 1934 and killed some wheat before the filling of the heads. Control of the young bugs was obtained in 1933 with derrisol and also with a calcium cyanide dust, neither of which affected the wheat. Preliminary investigations indicated that water heated to 130–165°F. killed all the bugs when not more than ½ U.S. pint was poured into the curl of the maize plant. Maize and *Sorghum* were slightly injured but soon recovered. The green bug

[*Toxoptera graminum*, Rond.] re-appeared in abundance on wheat in the spring of 1934 and caused appreciable damage in 28 counties. Successful control was obtained by covering the infested spots with straw and burning it. Plants that had been burned on the tops recovered. The outbreak was finally brought to an end by Coccinellids and parasites. *Chorizagrotis auxiliaris*, Grote, caused considerable injury to wheat in south central Kansas in the spring of 1934.

Ears of maize planted in early May were almost all infested by the corn earworm [*Heliothis obsoleta*, F.], but were less severely injured than others. Comparatively less damage was caused to the more widely spaced plants in other experiments. In tests of dusts, undiluted lead arsenate gave the best results, commercial sodium fluosilicate scorched the silks and husks and rendered the ears unsaleable, and pyrethrum gave 60 per cent. control before the silks were out but was practically useless afterwards. None of 14 other insecticides tested gave good results.

Infestations by wireworms of the genus *Melanotus* seem to be determined less by the kind than by the sequence of crops in a rotation system [*cf.* **21** 353]. The larvae become active in the upper few inches of soil before the temperature there has increased sufficiently to insure rapid germination of maize seed. Plants 4–5 ins. high are most heavily infested. Larvae showed little preference in food-plants, but are apparently unable to live on humus. They remain near the surface throughout the winter and become active when the temperature of the soil is slightly above freezing point. They can withstand freezing temperatures without injury. Outbreaks of *Macrosiphum onobrychis* occurred on lucerne during spring in 1933 and 1934, the latter being the most extensive attack since 1921. An exceptionally large population of the convergent ladybird beetle [*Hippodamia convergens*, Guér.] put a stop to the infestation on 7th May. *Sarcophaga kelleyi*, Aldr., a parasite of grasshoppers, was unusually abundant during August-September 1932. Some grasshoppers were killed by *Empusa grylli*. *Feltia annexa*, Treit., and *F. subgothica*, Haw. (*ducens*, Wlk.) caused noticeable damage to lucerne in the autumn of 1933 for the first time in recent years. Most of the larvae were destroyed by cold weather. *Scotogramma trifolii*, Rott., appeared for the first time in numbers in clover and lucerne fields in the summer of 1933.

McIndoo (N. E.). **The Relative Attractiveness of certain Solanaceous Plants to the Colorado Potato Beetle, *Leptinotarsa decemlineata* Say.** —*Proc. ent. Soc. Wash.* **37** no. 2 pp. 36–42, 1 fig., 3 refs. Washington, D.C., 11th April 1935.

Experiments were carried out in 1930 and 1932 in Maryland to determine the relative attractiveness to larvae and adults of *Leptinotarsa decemlineata*, Say, of the leaves of potato (*Solanum tuberosum*), horsenettle (*S. carolinense*), bitter nightshade (*S. dulcamara*) and tomato (*Lycopersicum esculentum*) [*cf. R.A.E.*, A **21** 494, 495]. Further tests were made in 1933 to determine whether the relative attractiveness of these leaves depended on the species on which the beetles had been reared. Between 50 and 60 beetles, either adults less than a week old, males and females being tested separately, or last instar larvae, were put in each of 4 cages. Four 1-inch squares, cut from the leaf of each species of plant, were placed on pieces of cardboard $1\frac{3}{4}$ in. square in each cage and arranged in a different

order in each cage to allow for the influence of position on their attractiveness. After 15 minutes, the insects in contact with each square were counted. The test was then repeated 3 times, fresh leaf squares being placed on the pieces of cardboard in a different order, so that in each group of tests 16 of the 24 possible arrangements of the leaf squares were used. Of the adults and larvae that were reared on potato in 1930 and 1932 more larvae and adult males were attracted to horsenettle than to the other plants and more females to potato. In 1933, beetles of both sexes that had been reared on nightshade in the field were attracted in larger numbers to horsenettle. Females from these tests were allowed to oviposit on horsenettle leaves in battery jars, and beetles were then reared from these eggs on horsenettle leaves. Results from 3 groups of tests with these beetles showed that more were attracted to potato than to other plants. The insects were not reared on leaves of tomato, which was the least attractive plant in all the tests.

REED (W. D.). **Notes on the Distribution of Cured Tobacco Insects in the Near East.**—*Proc. ent. Soc. Wash.* **37** no. 2 pp. 42–48, 1 ref. Washington, D.C., 11th April 1935.

In 1930 [*R.A.E.*, A **19** 215], 1931 and 1932 several infestations of native flue-cured tobacco by *Ephestia elutella*, Hb., were discovered in the United States, and this moth and *Lasioderma serricorne*, F., were both found in considerable numbers in tobacco imported from Greece and Turkey. In view of this, a survey of the distribution of insects in stored tobacco in those countries was made in 1933. The 68 warehouses inspected were divided into group A, which contained practically no old-crop tobacco and no accumulations of scrap tobacco, and group B, which contained large stocks of old-crop and much scrap tobacco. *E. elutella* and its parasite, *Microbracon hebetor*, Say, and *L. serricorne* were generally distributed throughout Greece and Turkey. Of 235 bales of tobacco in the 30 warehouses in group A, 59·2 per cent. were infested by *Ephestia*, 26·4 per cent. by *Lasioderma*, and 28·1 per cent. contained evidence of the presence of *M. hebetor*. The corresponding figures for the 38 warehouses and 188 bales examined in group B were 90·4, 35·6 and 61·2. *Aplastomorpha calandrae*, How., which parasitises the larvae of *Lasioderma*, was found only in one bale of tobacco, and no evidence of parasitism of *Ephestia* by *Nemeritis canescens*, Grav., was observed in the warehouses in group A, whereas in group B, *N. canescens* and *A. calandrae* were found in 5·8 per cent. of the bales inspected, though only in negligible numbers. In Greece adults and larvae of *Tenebroides mauritanicus*, L., which is predacious on *L. serricorne* were seen in 15 bales in one warehouse in group B and *Pediculoides ventricosus*, Newp., was observed attached to larvae of *L. serricorne* in another. Observations made in curing-yards, planters' houses and small storage houses in villages indicated that infestation may start before the tobacco is purchased.

MILES (H. W.). **The Plum Fruit Sawfly and its Control.**—*J. Minist. Agric.* **42** no. 2 pp. 129–133, 3 pls., 7 refs. London, May 1935.

An account is given of the bionomics of *Hoplocampa flava*, L., on plums and damsons in England [*cf. R.A.E.*, A **21** 560] and of experiments carried out on its control in northern Lancashire during 1934.

The application of a spray of 8 oz. nicotine and a spreader in 100 gals. water on 21st May (2 days after hatching) and again on 25th May greatly reduced infestation on 4 varieties, and it appears that a nicotine wash will give good control if it is timed to coincide with the hatching of the eggs, only a few of which are exposed during incubation. The spray should be applied about 10 days after the petals fall and be repeated within a week.

EDWARDS (E. E.). **The Pigmy Mangold Beetle : a serious Pest of Sugar-beet and Mangold Crops.**—*J. Minist. Agric.* **42** no. 2 pp. 148–154, 2 refs. London, May 1935.

The information contained in this paper on *Atomaria linearis*, Steph., and its control on mangel and sugar-beet in England is substantially the same as that previously noticed [*R.A.E.*, A **22** 387]. The only practical means of eradicating this beetle once it becomes established is to give up growing these crops for at least two years and to keep the land free from other varieties of beet and *Chenopodium album*, which are alternative food-plants. Furthermore, susceptible crops should not be sown near areas that were infested in the previous season.

SALT (G.). **Experimental Studies in Insect Parasitism. III. Host Selection.**—*Proc. roy. Soc.* **117** no. B 805 pp. 413–435, 1 fig., 8 refs. London, 1st May 1935.

A detailed account is given of numerous experiments undertaken to discover some of the criteria by which ovipositing females of *Trichogramma evanescens*, Westw., select their hosts. Tests were carried out to discover if rearing *Trichogramma* on particular insects would result in the development of biological races that would attack different kinds of hosts. Two strains, derived from one original female and reared through 63 and 43 generations on *Sitotroga cerealella*, Ol., and *Ephestia kühniella*, Zell., respectively, showed no dependence on, or preference for, their respective hosts ; in fact the eggs of *Ephestia*, which are larger, were preferred by both strains when they were given their choice of both hosts. The parasites used in the experiments were obtained from a pure strain reared on *Sitotroga*. When eggs of *Ephestia* were exposed with those of *Sitotroga*, *Bruchus obtectus*, Say, or *Agrotis pronuba*, L., when eggs of *Sitotroga* and *Ephestia*, differing in relative size, were exposed together, and when eggs of *Sitotroga* were placed with particles of sand or seeds of *Lobelia*, the parasite always preferred the larger hosts, in spite of the fact that the progeny could not develop in some and eggs could not even be laid in others. No character other than their relative size was common to the preferred hosts. In addition to sand and seeds, other " false hosts," including crystals of calcium carbonate, globules of mercury, pieces of glass, etc., were readily attacked if they were of suitable size. Finally, the selection observed was an actual preference, not merely a random proportion of the number of hosts found.

It appears that the host egg must be raised above the surrounding surface for *Trichogramma* to find it, that it should not have a grossly repellent odour for the parasite to approach it and that it should be immobile, dense enough to stand on and neither too wet or sticky for the parasite to examine it. Ovipositing females will accept objects having

these characteristics provided that the volume lies between 0·02 and 30 cu. mm. and that no dimension is more than four times greater than another.

The fact that the females of *Trichogramma* habitually attacked false and unsuitable hosts in the presence of true ones overthrows the theory that they select their hosts by instinct, defined as the ability of the insect to recognise that which is suitable for its purpose [*cf. R.A.E.*, A **15** 338].

In connection with population studies of *Trichogramma*, it appears that the reproductive rate is reduced by the parasite wasting its progeny in attempting to oviposit in false hosts and by successfully ovipositing in others that are unsuitable for development. Moreover, since the parasite habitually deposits more than one egg in the larger hosts, more hosts are left to survive and reproduce in the next generation. These factors have a direct bearing on biological control operations and may explain the differences of opinion among economic entomologists in connection with the value of *Trichogramma* in the control of certain insect pests.

CALLOT (J.). **Première note sur les parasites des sauterelles à Richelieu (Indre-et-Loire).**—*Ann. Parasit. hum. comp.* **13** no. 3 pp. 193–202, 8 refs. Paris, 1st May 1935.

The following is substantially the author's summary: In Richelieu (Indre-et-Loire) adults of various grasshoppers have been found parasitised by larvae of Sarcophagids and Conopids. *Stauroderus bicolor*, Charp. (*mollis*, Charp.) is especially the host of *Sarcophaga tuberosa*, Pand. (*exuberans*, Pand.) and *Stauroderus* sp. of *Sarcophaga* (*Ravinia*) *haematodes*, Mg. Only a small percentage of the grasshoppers are parasitised by these larvae, and the parasitism seems to have very little effect on their activities. The Sarcophagid larvae overwinter in the larval stage, whereas the Conopids, which have not been identified, pass the winter in the pupal stage.

BOCZKOWSKA (M.). **Contribution à l'étude de l'immunité chez les chenilles de *Galleria mellonella* L. contre les champignons entomophytes.**—*C. R. Soc. Biol.* **119** no. 16 pp. 39–40. Paris, 1935.

In laboratory investigations, larvae of *Galleria mellonella*, L., infected with various entomogenous fungi, of which *Beauveria bassiana* and *Metarrhizium anisopliae* were the most pathogenic, often developed patches of black stain caused by masses of leucocytes beneath the chitin. Eventually, the hypoderm gave way, became detached and began to degenerate, and blood cells agglomerated in the cavity under the chitin. This protection against infection is, however, insufficient if a great number of spores attack the cuticle of the larva, as the chitin splits and the spores penetrate into the tissues. Larvae covered with stains 1–2 mm. in diameter invariably died, whereas those with small dots sometimes survived and pupated, a fact that indicates that the integument is able to resist the infection. The larvae were killed more quickly when an emulsion of the spores was injected than when it was smeared on, but smearing with the emulsion produced external contamination more rapidly than dusting with dry spores.

Attempts to induce acquired immunity were unsuccessful. Larvae inoculated first with heated spores and later with unheated spores succumbed more quickly than those inoculated only with unheated

spores. The spores were not killed by heating for an hour at 60°C. [140°F.] or for 15 minutes at 100°C. [212°F.]. Larvae into which only heated spores were injected lived a few days longer than those inoculated with unheated spores. The decrease of pathogenic power in the heated spores indicates the possibility of obtaining an acquired immunity. It appears that the rapid development of the fungi saves them from being destroyed by leucocytes. The spores remained alive for more than a year.

Frisque (K.). **La Fourmi d'Argentine** *Iridomyrmex humilis* **Mayr dans les serres en Belgique.**—*Bull. Ann. Soc. ent. Belg.* **75** no. 3–4 pp. 148–153, 3 refs. Brussels, 25th April 1935.

Iridomyrmex humilis, Mayr, the worker of which is described, was observed in 1934 in a number of greenhouses in Belgium on orchids of several genera, a list of which is given. Its geographical distribution and habits are briefly outlined. Its chief importance consists in its association with Aphids and Coccids; these, especially *Cerataphis lataniae*, Boisd., were always much more abundant on orchids where it was present.

Remedial measures include the destruction of the nests with tar distillate or boiling water, and the use of arsenical baits. The bait should only contain 2–5 per mille arsenic, as it then acts slowly, the ants carry it to their nests, and the whole colony is thus exterminated [*cf. R.A.E.*, A **8** 285]. A formula used successfully in Belgium is 600 gm. sugar, 400 gm. water, 5 gm. arsenic (dissolved) and 2 gm. salt.

Zucht (G.). **Zur Biologie von** *Agelastica alni* **L.**—*Dtsch. ent. Z.* 1934 no. 3–4 pp. 145–218, 25 figs., 1 pl., 2 pp. refs. Berlin, March 1935.

The life-history of the Galerucid, *Agelastica alni*, L., is described in great detail from field observations near Berlin. Notes are given on the effect of meteorological conditions on the larvae and adults. After hibernating under leaves, both sexes appear at the end of April on alder. Oviposition begins towards the end of May. Batches of about 60 eggs are laid at intervals of 3–5 days. Single females laid as many as 7 batches. Oviposition ceases at the end of June, and the adults die soon afterwards. The egg stage lasts about 15 days, but is much shorter in eggs belonging to the batches laid last. The larvae have 3 instars, the first of which lasts about 7 and the second 5–7 days. The third instar larvae remain on the plant for about 10 days and then enter the ground, where they prepare earthen pupal chambers in which they pupate after 9–11 days. The pupal period takes about 8 days, and after another 3 days the young adults leave the ground and appear on the alders from the end of July onwards. Larvae and adults were observed to feed on the leaves of *Alnus incana* and *A. glutinosa*, and larvae were also found feeding on birch, *Betula pubescens*. During September the adults seek their winter-quarters among fallen leaves.

Eckstein (F.). **Der jetzige Stand der Maiszünsler-Frage in Deutschland.** [The present Position of the Maize Pyralid Question in Germany.]—*Anz. Schädlingsk.* **11** nos. 4–5 pp. 44–47, 56–59, 1 chart, 10 refs. Berlin, April–May 1935.

In view of the production of varieties of maize suitable for cool climates, a great extension of maize cultivation in Germany is anticipated, and the author surveys the relation between the growth of the

plant and *Pyrausta nubilalis*, Hb., which is a serious pest of maize in Baden. He suggests that it has biological races, since Roubaud has recorded that it is attracted by *Artemisia* [*vulgaris*] [*R.A.E.*, A **19** 145], whereas this is not the case in Baden. The effect of climatic factors on the Pyralid is discussed in relation to published data on temperature and rainfall in various places in Germany and the possibility of its spread to them.

MAERCKS (H.). **Beobachtungen über Lebensdauer und tägliche Eimenge des bekreuzten Traubenwicklers, *Polychrosis botrana*, Schiff.** [Observations on the Longevity and daily Egg-production of *P. botrana*.]—*Anz. Schädlingsk.* **11** no. 5 pp. 49–53, 4 graphs, 8 refs. Berlin, May 1935.

In August and September 1934 the author made observations in South Germany on the longevity and daily egg-production in five females of *Polychrosis botrana*, Schiff. The literature on egg-production by this moth is surveyed. One female lived 30 days and laid 313 eggs at an average temperature of 20°C. [68°F.] with limits of 15·5°C. and 24·5°C. [59·9° and 76·1°F.]. Two other females lived 27 days and deposited 214 and 182 eggs respectively. One female was fertilised 16 days after emergence, having laid no eggs previously. Oviposition began at once, but 51 per cent. of the eggs laid on the first day were not fertile. This female lived 32 days and laid 147 eggs. A male successfully fertilised three females during the first days of life and lived for at least 16 days. A second mated male lived for 15½ days.

[ZELISHCHENSKAYA] SSELISTSCHENSKAJA (A.). **Die Ernährung des Pappelbockes (*Saperda carcharias* L.).** [The Food of the Poplar Longicorn.]—*Anz. Schädlingsk.* **11** no. 5 pp. 54–55, 3 figs., 4 refs. Berlin, May 1935.

Following injury to leaves of poplars near Leningrad by adults of *Saperda carcharias*, L., laboratory observations were made on its manner of feeding. The adults lived for 2–4 weeks and fed mainly on the leaves, in which they cut holes, but they also injured the leaf-veins and leaf-stems and ringed the bark of twigs. Ringed branches and stems were also seen in poplars from 1 to 3 years old.

Adults of the willow longicorn, *Oberea oculata*, L., have also been observed in the field and in the laboratory feeding on leaf-blades and leaf-veins.

SCHNEIDER (H.). **Wintergersteschädigung durch Zwergzikade.** [Injury to Winter Barley by a Jassid.]—*Dtsch. landw. Pr.* no. 35, 1st September 1934. (Abstr. in *Anz. Schädlingsk.* **11** no. 5 p. 59. Berlin, May 1935.)

In May and June 1934 about 7½ acres of winter barley in Germany were destroyed by *Cicadula sexnotata*, Fall. This Jassid normally occurs on meadow grasses and passes to cereals only when unusually abundant. Its numbers are greatly reduced by prolonged cold, wet weather. Infested plants, which harbour the eggs, should be mown and used as green fodder in the second half of June, and the stubble then ploughed under.

Gesetzliche Regelung der Blattsaugerbekämpfung. [Police Regulation of Measures against the Apple Leaf-sucker.]—*Anz. Schädlingsk.* **11** no. 5 p. 60. Berlin, May 1935.

In view of the increasing injury to apple blossom by *Psylla mali*, Schm., in the Lindau district on Lake Constance, Germany, all owners of apple trees were required in January 1934 to spray with tar distillate, at a strength of at least 8 per cent., before the buds opened. This measure was quite successful.

Schmidt (E.). **Ueber einen Fall von Sekundärparasitismus: Eine Ophionine aus der Tachine des Erlenblattkäfers.** [A Case of secondary Parasitism: An Ophionine from the Tachinid of the Alder Leaf Beetle.]—*Mitt. dtsch. ent. Ges.* **6** no. 1–2 pp. 7–10. Berlin, 1935.

During observations in the Rhineland, earthen pupal chambers of the Galerucid, *Agelastica alni*, L., were found to contain pupae of its Tachinid parasite, *Meigenia bisignata*, Mg., for which the author considers *M. mutabilis*, Fall., to be the correct name. The Tachinid pupae were kept apart from those of the beetle and some of them produced adults, while *Mesochorus thoracicus*, Grav., emerged from others.

[Sakharov (N. L.).] **Сахаров (Н. Л.) The Resistance of agricultural Plants, Immunity and agricultural Measures in the Control of Pests.** [*In Russian.*]—*Social. Grain Fmg* **5** no. 1 pp. 147–156, 8 refs. Saratov, 1935.

This is a general discussion, largely based on the literature, of the possibility of safeguarding crops from insect pests by various agricultural measures, including the cultivation of resistant varieties of plants. The fact that haricot beans and chick-peas [*Cicer arietinum*] are the only leguminous plants not infested by the Pyralid, *Etiella zinckenella*, Treit., in Russia seems to indicate that it might be possible to get new and resistant pulse crops by selection and cross-breeding. Similarly, potatoes might be rendered immune from the larvae of the meadow moth [*Loxostege sticticalis*, L.], which do not readily feed on potato or tomato because the leaves contain poisonous solanin. But since the possibilities of cultivating immune varieties are very limited, other agricultural measures need to be used and in some cases control by insecticides is necessary.

Edwards (W. H.). **Report of the Government Entomologist.**—*Rep. Dep. Agric. Jamaica 1933* pp. 21–23. Kingston, 1935.

In Jamaica during 1933, *Metamasius sericeus*, Ol., which does not normally infest healthy canes, damaged sugar-cane blown down by recent hurricanes. *Cosmopolites sordidus*, Germ., caused unusually severe injury to bananas [*R.A.E.*, A **22** 450]. Owing to the constant humidity, entomogenous fungi were unusually active and greatly reduced infestation of *Citrus* by Coccids. The direct damage caused by the ant, *Solenopsis geminata*, F., which also fosters *Coccus viridis*, Green, has become more important with the recent increase in the number of budded plants in the groves. The destruction of the tender bark of young shoots is more serious when the buds are placed on old

stems cut only a few feet from the ground. Damage may be reduced by banding with grease, by smearing injured parts with Bordeaux paste, and by destroying the nests. *Cremastogaster brevispinosa*, Mayr, frequently caused severe damage to oranges, particularly sweet ones, by gnawing the rind where the oil cells had been damaged. The destruction of its arboreal nests is recommended despite the fact that these have been purposely distributed against the citrus blackfly [*Aleurocanthus woglumi*, Ashby]. *Eretmocerus* [*serius*, Silv.] [*cf.* **22** 66], which is being liberated throughout the Island, is remarkably successful in controlling this Aleurodid. Outbreaks of *Asterolecanium palmae*, Morg. & Ckll., of no great importance occurred on coconut during the end of the year over restricted areas on the north coast. Intensive infestation was confined to patches where the trees had suffered badly from adverse climatic conditions. *Aleurodicus pimentae*, Laing, does not seem to have spread. It caused little damage to pimento because constant humidity had enabled the fungus, *Aschersonia aleurodis*, almost to eradicate it from areas where it breeds in great abundance in dry weather.

Squire (F. A.). **Rice Weevil Control.**—*Agric. J. Brit. Guiana* **6** no. 1 pp. 4–10, 4 pls. Georgetown, March 1935.

In an experiment in British Guiana, ½ lb. calcium carbonate [*cf. R.A.E.*, A **23** 173] was stirred into each of 8 bags containing 90 lb. rice on 11th September 1934, and 8 other bags were left untreated except that the contents were stirred for a similar length of time. The bags were stacked in alternate piles of 4 bags. They were then free from infestation by the rice weevil [*Calandra oryzae*, L.]. Samples of rice from the bags were examined on 5th December and 5th February and the bags were weighed. In the untreated samples the number of weevils increased from 536 in December to 2,027 in February, the percentage of infestation from 11·54 to 26·3 and the loss in weight of the bags from 18 to over 52 lb., but the corresponding figures for the treated material were only 49 to 232, 0·49 to 4·5 per cent. and 7 to 12 lb. Experiments were undertaken on similar lines with sodium fluosilicate [*cf.* **22** 136], 1 oz. mixed with 4 oz. lime being stirred into each of 14 bags containing 90 lb. rice on 25th June 1934 ; the same number were used as controls, and all were apparently free from infestation. On 24th October the number of weevils in the untreated and treated samples, respectively, had reached 2,789 and 292, the average infestation 17·3 and 2·6 per cent., and the loss in weight of the bags over 63 and 3 lb.

Myers (J. G.). **The Ecological Distribution of some South American Froghoppers of the Genus *Tomaspis* (Hem., Cercopidae).**—*Trop. Agriculture* **12** no. 5 pp. 114–118, 10 refs. Trinidad, May 1935.

An account is given of ecological studies of 15 species of the genus *Tomaspis* [*cf. R.A.E.*, A **22** 685], including *T. saccharina*, Dist. (sugar-cane froghopper), made in Trinidad and northern South America during a search for possible parasites of the latter. Ecologically they may be divided into forest, riparian and savannah forms. A special study was made of the last, since a parasite attacking them would have more chance than a rain-forest insect of adapting itself to the dry cane-field conditions to which *T. saccharina* has become acclimatised. This is the only froghopper that is a serious pest on sugar-cane ; it occurs in

Trinidad, in Grenada and (rarely) in St. Vincent. The next in importance is *T. flavilatera*, Urich, which occurs in British Guiana, but is localised and sporadic. *T. tristis*, F., is recorded as an occasional pest on the coast of Dutch Guiana and was seen attacking sugar-cane in Brazil on the Lower Amazon, where *T. morialis*, C. & M., and more frequently, *T. mura*, C. & M., also attack cane planted in the riparian zones that form their normal habitat. *T. propinqua*, Wlk., occurs on sugar-cane in Venezuela, but has never been recorded as a serious pest.

Summerville (W. A. T.). **The Bronze Orange Bug.**—*Qd agric. J.* **43** pt. 3 pp. 245–253, 7 figs. Brisbane, 1st March 1935.

The Pentatomid, *Rhoecocoris sulciventris*, Stål, is a major pest of *Citrus* in a small area of south-eastern Queensland where the average temperature is low. It is also found in northern New South Wales. The young nymphs may be transported in grass taken from the vicinity of *Citrus* trees (amongst which they frequently crawl) for use in packing pineapples, but the spread of the bug is considered unlikely, owing to its dependence on climatic conditions. It is essentially a pest of vigorous trees and prefers the cooler sides and the higher branches. It feeds on the tender twigs, which wither and die back, and on the young fruit and the stalks of the fruit, leaves and flowers, which soon fall. After a few successive years of heavy infestation, the trees produce little new growth and become incapable of carrying a crop. In the districts concerned all varieties of *Citrus* grown commercially are attacked, but oranges appear to be more attractive than lemons or mandarins. The bugs also reproduce on *C. australis* [*cf. R.A.E.*, A **11** 278], but the numbers migrating from this source to the orchard are insignificant compared with the number breeding there already. It has been repeatedly noticed that infestation does not become severe for several years in orchards in which control has been successful, and this would be strange if migration were a major factor. The bugs, particularly the older nymphs and adults, eject (to a distance of as much as 2 ft.) a corrosive liquid that causes severe burning on tender parts of the skin and temporary blindness if it strikes the eye.

A spray of resin, caustic soda and fish oil [**19** 714] is considered the best control. Jarring the trees to dislodge the bugs [*cf.* **11** 572] never gives more than 70 per cent. control and always results in injury to the trees; moreover, it can only be carried out at a time when a certain amount of damage has already been done and when the crop is just setting. Handpicking is slow, unpleasant and ineffective, except on very small trees.

Newman (L. J.). *Thrips imaginis* (**Bag.**).—*J. Dep. Agric. W. Aust.* (2) **12** no. 1 pp. 84–86, 1 graph. Perth, March 1935.

It was further demonstrated by observations in Western Australia during 1934, which are here recorded, that the swarming of *Thrips imaginis*, Bagn., depends on meteorological conditions [*cf. R.A.E.*, A **22** 22, etc.] and that if these are unfavourable during October-November the thrips will not be a serious pest of apples, even if large numbers have survived the previous winter and have been active in August.

Wickens (G. W.). **Codlin Moth.**—*J. Dep. Agric. W. Aust.* (2) **12** no. 1 p. 89. Perth, March 1935.

An infestation of the codling moth [*Cydia pomonella*, L.], apparently of one season's standing, has been discovered in Western Australia

but was confined at the time of writing (1st March 1935) to 3 orchards covering an area of 10 acres. No infested apples or pears were found, but 300 hibernating larvae were collected from the trunks and branches. As an extra precaution, chemically treated bands were applied to all the trunks.

Entomological Investigations.—*Rep. Coun. sci. industr. Res. Aust.* **8** (1933–34) pp. 16–23, 57. Canberra, 1935.

About 4,400 larvae of *Anaitis plagiata*, L., and *A. efformata*, Gn., were received in Australia during 1933–34 from the laboratory of the Imperial Institute of Entomology for liberation against St. John's wort (*Hypericum perforatum*). Large numbers were reared, and liberations will be made during 1934–35. Work with *Chrysomela varians*, Schaller, and *C. hyperici*, Forst., is to be discontinued, since few individuals have survived out of the 26,000 and 28,000 liberated during the last few years under various conditions in Victoria and New South Wales [*cf. R.A.E.*, A **22** 223; etc.]. Further introductions of *C. brunsvicensis*, Grav., will be made, however, since only 800 individuals have been liberated owing to the difficulty of transporting this species. Noogoora burrs (*Xanthium pungens*) containing about 23,000 hibernating larvae of *Euaresta aequalis*, Lw., and 1,000 individuals of *Cylindrocopterus adspersus*, Lec., were obtained from Kansas together with a small consignment of *Baris callida*, Csy., which appeared to be harmless to economic plants in tests. About 20,000 adults of *Euaresta* were liberated in Queensland. In Australia, *Cylindrocopterus* attacks no economic plants except Jerusalem artichoke [*Helianthus tuberosus*] and sunflower [*H. annuus*].

Over 13,000 predacious Bdellid mites, *Biscirus lapidarius*, Kramer, were collected in Western Australia for distribution against *Smynthurus viridis*, L. [*cf.* **22** 313]. A consignment of *Leucopis* [*obscura*, Hal.] again arrived from England in bad condition [*cf.* **22** 224], and owing to the difficulty of transporting this Agromyzid, work will be concentrated on other enemies of *Chermes* [*pini*, L.]; about 1,300 individuals of *Exochomus quadripustulatus*, L., and 40 of *Anatis ocellata*, L., were received in good condition but a few of *Exochomus* only oviposited. A total of 100 eggs of *Hemerobius stigma*, Steph., were obtained from England, and a number of them hatched. In tests of winter and spring spraying, lime-sulphur gave the best results against *Chermes*, which has increased markedly in plantations of pine [*Pinus radiata*] in the Federal Capital Territory. Newly hatched nymphs are carried by the wind. Natural enemies were scarce and appeared to be of little importance in plantations in New South Wales and Tasmania. Attempts will be made to introduce *Encarsia formosa*, Gah., into Tasmania in the spring from New Zealand, where it has become established on *Trialeurodes vaporariorum*, Westw. [*cf.* **22** 724], as consignments from England have been unsuccessful [*cf.* **22** 224]. No sign could be found of *Habrolepis dalmani*, Westw., and large numbers of parasitised individuals of *Asterolecanium variolosum*, Ratz. (oak scale) received from New Zealand will be liberated in a favourable locality.

Two consignments of about 300 mature larvae of *Stathmopoda* [*melanochra*, Meyr.] were sent to New Zealand, where numbers of moths have emerged, and there appears to be good prospects of the establishment of this predator against *Eriococcus*. Large numbers of apparently parasitised eggs and larvae of *Paropsis* [*dilatata*, Er.], another pest of

Eucalyptus, were also forwarded, and many Tachinids have emerged. A consignment of 5,000 egg-clusters of the eucalyptus weevil, *Gonipterus* [*scutellatus*, Gyll.] were sent in November to South Africa, where a few parasites were obtained from them.

Work on *Thrips imaginis*, Bagn., has been previously noticed [*cf.* **23** 148, etc.]. A survey during October–November of the damage caused by *Oncopera* in Tasmania showed that native pastures are less severely injured than sown ones and that the larvae show preference for certain pasture plants, though in their absence they attack any kind. A thick growth of grass in late summer or autumn provides cover for the moths and young larvae, and should be removed about the time of the flight of the adults by heavy grazing or burning. Larvae may be destroyed in low lying pastures by flooding between July and October. Starlings and bandicoots are the principal natural enemies and should be encouraged. Some larvae were parasitised by Tachinids, but as these belong to species that primarily attack other insects, it is considered improbable that they are of any importance in the control of *Oncopera*. Further consignments of *Hexamera* (*Protohystricia*) [*cf.* **22** 224] were received from New Zealand. In Tasmania these flies emerge some time before the main host species, *O. intricata*, Wlk., has reached a suitable stage for parasitisation, and liberations have therefore been confined at present to Victoria where there are several related species that develop earlier. However, the discovery of two additional species of *Oncopera* in Tasmania increases the possibility of the establishment of the parasite there. In tests against termites [*cf.* **22** 685], colonies containing about 500,000 individuals were totally destroyed by the application of $\frac{1}{8}$ oz. white arsenic. The temperature within a mound is dependent on the size of the population and is increased by the presence of particular castes, especially the nymphs and winged individuals. The preferred degree is apparently related to the moisture content of the mound material and varies with the season. Paris green dust gave the best results against small colonies of *Iridomyrmex detectus*, F. Sm., which were also generally destroyed by single applications of dusts of sodium fluoride, calcium arsenate or white arsenic, fumigation with calcium cyanide or liquid treatments of creosote, or crude or crank-case oils, but it was difficult to kill all individuals in medium and large colonies.

Cactoblastis cactorum, Berg, continued to make successful progress in the control of prickly-pear (*Opuntia inermis* and *O. stricta*) [*cf.* **21** 276, etc.], and its liberation was limited to the distribution of small numbers in special areas. The infestation of the secondary growth of prickly-pear by the larvae is most satisfactory, and the moth has shown that it is able to attack prickly-pear scattered over open country. Introductions from Argentina for the control of tiger pear (*O. aurantiaca*) consist of a strain of *Dactylopius ceylonicus*, Green (*indicus*, Green) and *D. confusus*, Ckll.; the latter has been liberated and is well established at various points.

DAVIDSON (J.). **Insects observed on Crops in South Australia during Period June 1932 to June 1934.**—*J. Dep. Agric. S. Aust.* **38** no. 8 pp. 998–1003. Adelaide, March 1935.

Much of the information on the principal pests has already been noticed from more detailed sources. Other pests include: *Arsipoda kingensis*, Blkb., which occurred on apricot, mulberry and other fruit trees in 1934; *Diphucephala colaspidoides*, Gyll., local outbreaks of

which caused injury to the fruit of apple in 1932 ; *Leptocoris* (*Serinetha*) *lurida*, Dallas, attacking the fruit of figs in 1934 ; *Caedicia simplex*, Wlk. (*olivacea*, Burm.), which was found feeding on the rind of oranges, producing serious surface blemishes ; *Pterohelaeus piceus*, Kby., which occurred in large numbers around the bases of orange trees, where it appeared to have eaten the rough bark ; and *Tortrix divulsana*, Wlk., which caused damage to seedlings of *Pinus radiata*. Among beneficial insects the Cocinellid, *Orcus australasiae*, Boisd., was found feeding on *Chermes* (*Pineus*) *pini*, L., on *Pinus radiata* in 1933, the mite, *Oribatula tibialis*, Nicolet, being commonly associated with it.

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CONTENTS.

	PAGE
AFRICA : Lesions caused by *Helopeltis* on Cotton and Tea	378
AFRICA, EAST : New Parasitic Hymenoptera from Italian Somaliland ...	356
AFRICA, EAST : Coffee Pests in Kenya in 1933	379
AFRICA, FRENCH WEST : Pests of cultivated Plants in Ivory Coast ...	356
AFRICA, PORTUGUESE EAST : *Ferrisiana virgata* on *Trilax*	356
AFRICA, SOUTH : Termites in Relation to Veldt Destruction	377
AFRICA, SOUTH WEST : A new Cricket in Houses (*Title only*)	399
AFRICA, WEST : Coffee Pests in Belgian Congo	378
AMERICA, SOUTH : New Species of Scolytids (*Title only*)	399
AMERICA, TROPICAL : The Ecological Distribution of *Tomaspis* spp. ...	395
ARGENTINA : Notes on Aphids...	361
ARGENTINA : New Species of *Apanteles*	361
ARGENTINA : Varieties of Peas in Relation to *Bruchus pisorum*	363
ARGENTINA : The Control of *Icerya purchasi* by *Rodolia cardinalis* ...	366
AUSTRALIA : Derris against *Plutella maculipennis*	346
AUSTRALIA : A Parasite of *Eurytoma fellis* in New South Wales	361
AUSTRALIA : The Bionomics and Control of *Rhoecocoris sulciventris* in Queensland	396
AUSTRALIA : Entomological Investigations in 1933–34	397
AUSTRALIA, SOUTH : Miscellaneous Pests in 1932–34	398
AUSTRALIA, WESTERN : Meteorological Conditions affecting *Thrips imaginis*	396
AUSTRALIA, WESTERN : An Infestation by *Cydia pomonella*	396
AUSTRIA : A List of commercial Insecticides	347
AUSTRIA : Data on *Aspidiotus perniciosus* (*Title only*)	400
BELGIUM : *Iridomyrmex humilis* in Orchid Houses	392
BRAZIL : *Saissetia discoides* on Guava	360
BRAZIL : The Establishment of *Prorops nasuta* against *Stephanoderes hampei*	364
BRAZIL : The principal Pests of cultivated Plants in S. Paulo	364
BRITISH ISLES : Records of Hymenopterous Parasites	354
BRITISH ISLES : Nicotine Sprays against *Hoplocampa flava*	389
BRITISH ISLES : The Control of *Atomaria linearis*	390
BRITISH ISLES : New Species of Aphids (*Title only*)	399

CONTENTS—*cont.*

PAGE

CANADA : Native Hosts of Parasites of *Cydia molesta* 372
CANADA : New Species of Braconids 373
CHILE : Records of injurious Insects... ... ... 360, 361
CHILE : The possible Biological Control of Aphids 360
CHINA : Grasshoppers of the Genus *Quilta* in Rice-fields 368
CHINA : The Effect of Submergence on Egg Parasites of *Scotinophara lurida* 368
CHINA : The Life History of *Chondacris rosea* 368
CHINA : A Geometrid on *Aleurites* in Chekiang 368
CHINA : *Atractomorpha ambigua* on Ginger 369
CHINA : Insect Enemies of Cotton Pests (*Title only*) 400
EUROPE : Climate in Relation to Forest Pests 347
EUROPE : Recent Studies on Forest Entomology 348
EUROPE : A Revision of the Species of *Calandra* 348
EUROPE : Pests and Diseases of Sugar-beet 354
FINLAND : Spraying Experiments against *Paratetranychus pilosus* ... 350
FORMOSA : The Influence of Temperatures on the Development of *Dacus* spp. 370
FORMOSA : Notes on injurious Thysanoptera 371
FRANCE : The Resistance of Forests to Insect Infestation 347
FRANCE : The Distribution of Aphids recently found on Strawberry ... 353
FRANCE : Observations on *Capnodis tenebrionis* 353
FRANCE : Dipterous Parasites of Grasshoppers 391
FRANCE : Records of Coccids (*Title only*) 399
GERMANY : *Dermestes lardarius* boring into Wood 348
GERMANY : Notes on *Panolis flammea* 348
GERMANY : The Effect of Climate on Lepidopterous Pests of Pine ... 349
GERMANY : Entomological Literature since 1740 in Pomerania and E. Prussia 352
GERMANY : The Effect of Cold on *Eriosoma lanigerum* 355
GERMANY : The Feeding of Larvae of *Galleria mellonella* 367
GERMANY : The Control of *Anthonomus rubi* on Strawberry 376
GERMANY : A Measure against *Zabrus tenebrioides* 376
GERMANY : The Bionomics of *Agelastica alni* 392
GERMANY : The Risk of the Spread of *Pyrausta nubilalis* 392
GERMANY : Longevity and Egg-production of *Polychrosis botrana* ... 393
GERMANY : Injury to Winter Barley by *Cicadula sexnotata* 393
GERMANY : Tar Distillate against *Psylla mali* 394
GERMANY : A Hyperparasite of *Agelastica alni* 394
GREECE : Insects infesting stored Tobacco 389
GUIANA, BRITISH : Dusts against *Calandra oryzae* in stored Rice 395
HAWAII : The Biology and Distribution of Ants 375
HOLLAND : Legislation providing for Control of *Leptinotarsa decemlineata* 355
INDIA : Lac Cultivation and the Shellac Industry 372
INDIA : A Tobacco Spray against *Thrips oryzae* in Rice Seed Beds ... 375
INDO-CHINA : Grasshoppers of the Genus *Quilta* in Rice-fields 368
INDO-MALAYAN REGION : The Species of the Genus *Thrips* 366
ITALY : A Tineid on Anise 356
JAPAN : A Parasite of the Eggs of *Lema oryzae* 363
JAPAN : A new Phorid infesting Mushrooms 367
JAPAN : The History of Injury to Rice by *Schoenobius bipunctifer* ... 369
KOREA : Factors affecting Injury to Trees by Leaf-eating Insects ... 369
KOREA : *Ephestia elutella* in stored Tobacco 369
KOREA : Observations on Lamellicorns 370
KOREA : The Insect Pests of Cotton 371
KOREA : The Bionomics and Utilisation of *Melaphis chinensis* (*Title only*) 400
MALAYA : Biological Notes on Ambrosia Beetles 347
MARQUESAS Is. : A new Species of Aphid (*Title only*) 399
MAURITIUS : The Campaign against *Lachnosterna smithi* in 1933–34 ... 345
NETHERLANDS INDIES : The Bionomics and biological Control of *Agrotis ypsilon* 362
NETHERLANDS INDIES : Pests of Sweet Potato in Java (*Title only*) ... 399
NETHERLANDS INDIES : Problems of Forest Entomology (*Title only*) ... 400
NEW ZEALAND : The Value of *Pteromalus puparum* against *Pieris rapae* ... 372
PERU : Insects observed in the Lachay Hills 360
POLAND : The Winter Generation of *Chlorops taeniopus* 347
POLAND : *Oscinella frit* on Oats 350
POLAND : Measures against *Calandra granaria* 351
POLAND : Ichneumonid Parasites of *Hemerophila pariana* 351
POLAND : The Entomological Literature published since 1800 352

CONTENTS—*cont.*

	PAGE
RUSSIA : Adult Feeding of *Saperda carcharias*	393
RUSSIAN UNION : A Revision of the DACNUSINAE (*Title only*)	399
SICILY : A new Form of *Sesamia vuteria* attacking Wheat	355
SOLOMON IS. : A new Weevil from Coconut Flowers	361
SPAIN : Work on Insect Pests, etc., in 1935	353
TURKEY : Insects infesting stored Tobacco	389
U.S.A. : Transmissibility by Aphids of Tobacco Mosaic from different Plants	346
U.S.A. : The Distribution and Control of Dutch Elm disease	357
U.S.A. : *Aspidiotus destructor* in Florida	358
U.S.A. : Papers on Codling Moth Control	358
U.S.A. : The Characters of the common Tetranychid Mites	358
U.S.A. : The Identity of a Mite on Apple, etc.	358
U.S.A. : The Bionomics of *Tachypterellus quadrigibbus magnus* in Kansas	359
U.S.A. : *Cydia molesta* in Kansas	359
U.S.A. : Pests of Strawberries and ornamental Plants in Kansas	359
U.S.A. : The Control of *Chermes abietis* on Spruce in Nurseries	366
U.S.A. : An introduced Anobiid destructive to Woodwork	367
U.S.A. : The Plants susceptible to Southern Celery Mosaic	367
U.S.A. : Miscellaneous Pests and their Control in Maine	373
U.S.A. : The Control of *Anthonomus grandis* in Oklahoma	374
U.S.A. : Paradichlorobenzene against Pests in Herbaria	374
U.S.A. : Work on Miscellaneous Pests in 1933–34	379
U.S.A. : A new Cecidomyiid infesting Watermelons	381
U.S.A. : Pests of Tomatos in Illinois	381
U.S.A. : A general Account of *Popillia japonica*	381
U.S.A. : Farm Machinery for Control of *Pyrausta nubilalis*	382
U.S.A. : Miscellaneous Pests in Florida in 1933–34	382
U.S.A. : The Control of Fruit Pests in Kentucky	383
U.S.A. : Insect Pests in Oklahoma during 1932–34	383
U.S.A. : *Phylloxera* spp. on Pecan in Oklahoma	384
U.S.A. : *Hypera punctata* on Lucerne in Oklahoma	384
U.S.A. : Observations on *Blissus leucopterus* in Oklahoma	385
U.S.A. : *Anasa tristis* on Squash in Oklahoma	385
U.S.A. : Studies on *Anthonomus grandis* in Oklahoma	385
U.S.A. : Spraying and Residue Problems on Fruit Trees and Currants ...	385
U.S.A. : A Dolichopodid predacious on *Dendroctonus monticolae*	386
U.S.A. : Miscellaneous Pests in Kansas in 1932–34	387
U.S.A. : The Attractiveness of different Solanaceous Plants to *Leptinotarsa decemlineata*	388
U.S.A. : Insect Pests of Boxwood (*Title only*)	399
WEST INDIES : The Biological Control of *Diatraea saccharalis*	345
WEST INDIES : Miscellaneous Pests in Jamaica in 1933	394
The Immunity of old Bees from *Acarapis woodi*	349
A possible Factor affecting the Sex of certain Ichneumonids	352
The Chemistry and Preparation of Lead Arsenates	354
The Keeping Quality of Derris and Rotenone	354
A Nematode infesting *Mimela testaceipes*	370
An Apparatus for applying small Amounts of Sulphur Dust	374
The Effect of Radio Waves on Insects and Plants	375
Experiments with Derris Insecticides	376
Host Selection in *Trichogramma evanescens*	390
The Question of Immunity from Fungi in *Galleria mellonella*	391
Agricultural Measures and Resistant Plants in the Control of Pests ...	394
A Catalogue of the Agaonids (*Title only*)	399
The Food-plants of *Platyedra gossypiella* (*Title only*)	400
New Diseases of *Bombyx mori* (*Title only*)	400
Effect of Environment on Eggs of *Bombyx mori* (*Title only*)	400
Anatomical Investigations on *Helopeltis antonii* (*Title only*)	400
The Metamorphosis of *Calandra oryzae* (*Title only*)	400
The Labium of *Locusta migratoria* (*Title only*)	400
The olfactory Receptors in Insects (*Title only*)	400
The Wax of *Cryptococcus fagi* (*Title only*)	400
Organic Thiocyanates as Insecticides (*Title only*)	400
LEGISLATION : Providing for Control of *Leptinotarsa decemlineata* in Holland	355

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